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15¢
WINTER ISSUE
A THRILLING PUBLICATION
IRON Men
An Astonishing Complete Novel By NOEL LOOMIS
THE RADIATION OF THE CHINESE VEGETABLE
A Hall of Fame Classic By C. STERLING GLEASON
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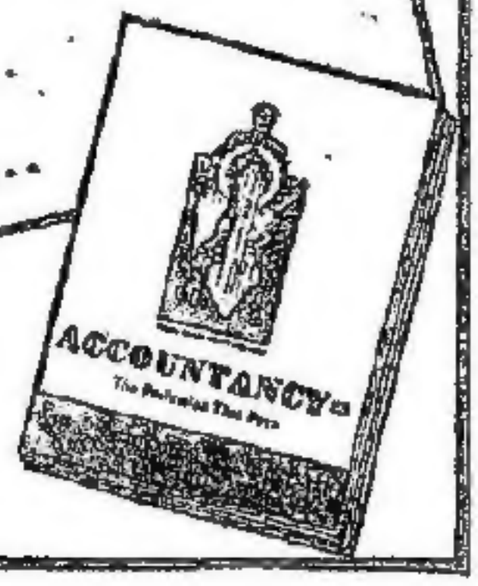

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Vol. 11, No. 3 CONTENTS Winter, 1945

## Complete Scientifiction Novel


# IRON MEN

By

**NOEL LOOMIS**

*Fleeing from the Cruel Masters of a Dying Earth, Len Niles, Champion of a Vanishing Race, Sails a Space-Ship into the Void on a Strange Quest for a New Planet!* ..... .....11


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Cover Painting by Earle Bergey—illustrating "Iron Men"

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December, 1944, issue.

Companion magazines: Thrilling Wonder Stories, Popular Western, Thrilling Mystery Novel, Thrilling Western, Thrilling Detective, Thrilling Adventures, Thrilling Love, The Phantom Detective, Sky Fighters, Popular Detective, Thrilling Ranch Stories, Thrilling Sports, Popular Sports Magazine, Range Riders Western, Texas Rangers, Everyday Astrology, G-Men Detective, Detective Novel Magazine, Black Book Detective, Popular Love, Masked Rider Western, Rio Kid Western, Air War, Exciting Western, West, Exciting Love, Army Navy Flying Stories, and Rodeo Romances.

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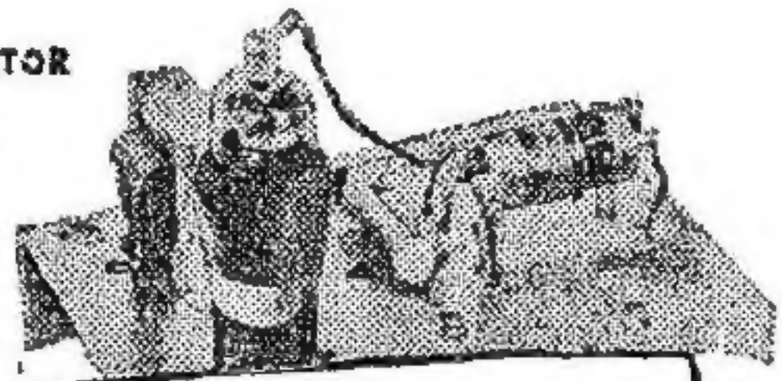

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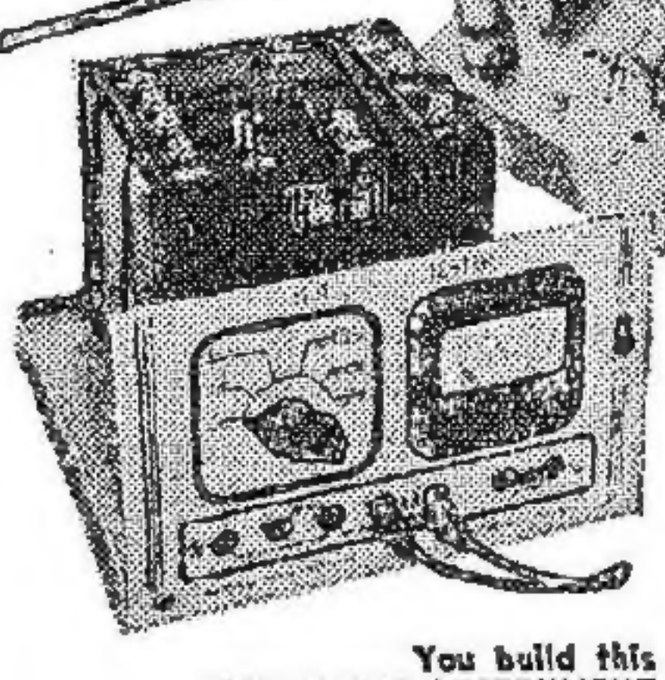

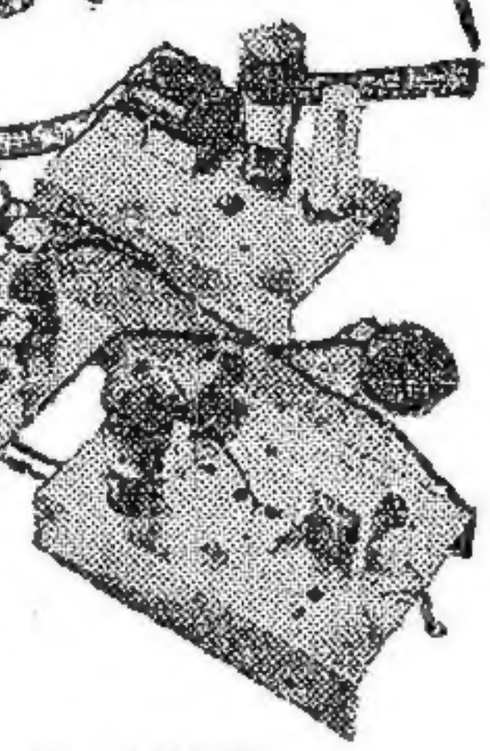

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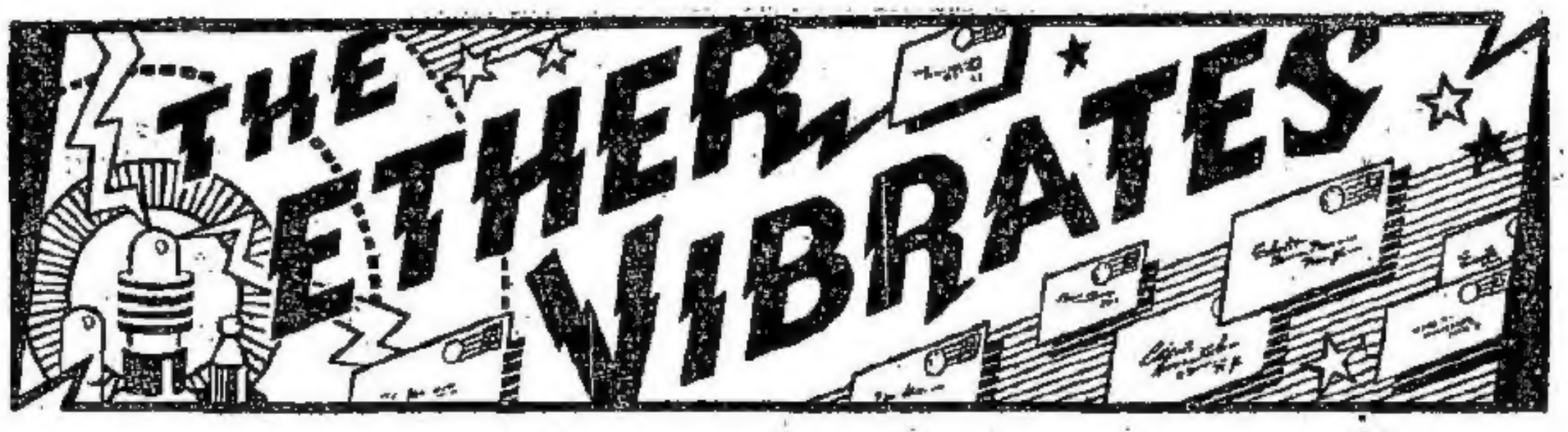


***A Department Where Readers, Writers and Sergeant Saturn Get Together***

THE triple-super atomic power was going full blast, and we were just about to turn on the juice for the takeoff when the space mailman gave his double ring at the fore-portal, and we managed to stick one claw through and come up with a last-minute letter from one J. Wasso, who writes on Bugg House stationery from Pen Argyl, Pennsylvania, back on bad old terra infirma.

Since his letter happens to fit directly into the plans of the old Sarge for the next issue of STARTLING STORIES, we're ignoring some of the supposed humor around the margins of the paper and giving you the gist of the contents in a hurry. Says Wasso:

Anent your avowed intention of occasionally publishing Captain Future novels in STARTLING STORIES, I would like to say that since you already had a Future novel scheduled before the suspension of CAPTAIN FUTURE, entitled "Red Sun of Danger," it shouldn't be difficult to include it soon in an early issue of STARTLING STORIES.

I miss the one and only matchless, unequaled, inimitable, unparalleled, peerless, invaluable, excellent and priceless Captain Future! Bring him back and let me out of this Bugg House!

Well, we're doing that very thing, Wasso, Jr. Our very next issue will see Curt Newton, Grag, the Brain, Otho, Joan Randall and all the gang back in a Brett Sterling special jaunt through space—yes, it's THE RED SUN OF DANGER.

This is one of the best of all the Captain Future yarns, with the Futuremen banding together to break a brutal monopoly on a distant planet that threatens the extinction of Earth itself. It is right on the beam all the way down to the last stirring climax.

So Captain Future hasn't gone to distant galaxies for the duration. He will be an occasional visitor to the good ship STARTLING STORIES, where he will appear from time to time to keep the appetites of Wasso, Jr., and his other ardent fans whetted.

Next issue will also feature, in addition to the long novel, a number of unusual short stories, a Hall of Fame Classic and all our regular features. So be on hand when the next issue appears!

Now for a personal gripe from the old Sarge. Some sub-sophomoronic would-be caricaturist from Pine Bluff, Arkansas, named Arthur McCourt, has had the unmitigated gall to come up with another drawing entitled "Sergeant Saturn." It is reproduced on this page.

At that, he has been gentle with the old Sarge compared to what Jack Wiedenbeck did to us in the Fall Issue in a drawing mistakenly attributed to E. E. Evans. It is a far less libellous presentation in a very nifty uniform indeed, but, oh, brother, how Al McCourt does underrate our gullet capacity.

That thing we are holding in our hand looks a lot more like a Venusian perfume bottle for

a Mercurian muskmaiden than anything fit for the old Sarge to drink. No wonder our tongue is hanging out a foot at such a disappointing prospect. We'll forgive the cross eyes and the cigarlike nose, but a Plutonian giant onion to McCourt for the sissy-sized bottle!

So we're off in a cloud of asterisk dust, heading for the far end of the universe. After some of the billets doux that have come flying at us out of the blue, we can't get there fast or far enough. But let's face the music now.

## ETHERGRAMS

Bergey takes another beating, but Brackett fares better in the first letter out of the bag.

### A THREAT AND A PROMISE

**By Benson Perry**

Dear Sarge: Well! Well! I have just gotten the fall ish of good old STARTLING STORIES. Very

*(Continued on page 8)*

# Three months after taking your course
# I STARTED TO PLAY FOR DANCES

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*says Miss Rosie Montemurro of Vancouver, B. C., Canada*

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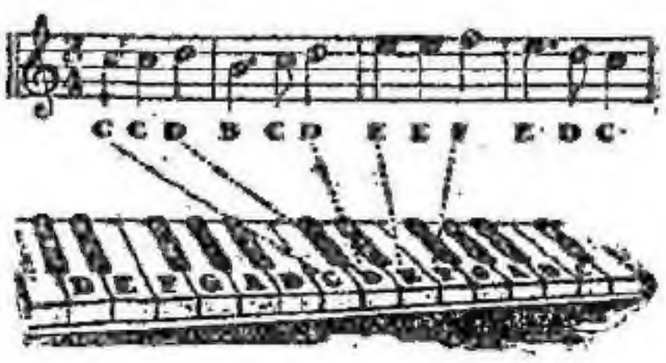
### See *how easy it is!*

**"My country 'tis of thee, sweet land of liberty"**




Look at the diagram. The first note on the music is "C." Follow the dotted line to the keyboard and locate "C" on the piano. Find the other notes the same way. Now strike the notes as indicated and you'll be playing the melody of that famous patriotic hymn, "America." Easy as A-B-C, isn't it?

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# THE ETHER VIBRATES

*(Continued from page 6)*

interesting. Very. I refer of course to the Bergey cover. You know it seems queer to read THE ETHER VIBRATES and hear them complaining about the last cover when you realize this is worse still.

Take for instance the perennial BEMs that are we assume the "black anthropoids". Now, that's a queer thing. Instead of black one of them is red, another is brown and the third is half of each. Come, come Bergey. Let's not be so literal.

When Miss Brackett says anthropoid she probably hoped the artist wouldn't be so literal as to draw an ape. Don't you think, Sarge (maybe I had better end the sentence here) that on different planets, animals have SLIGHT variations? Hmmmm?

Now for "Shadow Over Mars." It seems in two letters of mine that were published I attacked Leigh Brackett's work and in both cases you hoped that I might change my mind. Well, I did, and I'll tell you why. Leigh has an excellent literary style and when she lays off fantasy and tries STF we get doggone good stuff.

Your Hall of Fame was quite good but not a classic. Have you reprinted THE BLACK FLAME? Seems as though you have. Anyway do it now if it hasn't already been accomplished.

Confidentially, the shorts were terrible. The less comment the better.

Your review of the 'zines always interests the "fen" but why not make the reviews longer? Sometime I'll send in my horrible mag named UNBELIEVABLE GHASTLY FANTASIES which is a satire of everything. Or maybe CAPTAIN CROMAGNON.

And now to THE ETHER VIBRATES, hallowed sanctum, where peoples's opinions are always under Sarge's feet, in the way and in general a bother to the editors.

First, there is a letter from one U. G. Figley denouncing us letter-writers because we kick too much. There are fellows like that in all the magazines. They simply do not understand fen. The point is that we all like STF and we assume that the editors know it.

What the editors don't know is exactly what details we don't like, so we send in letters to tell them. That is what makes them seem rather complaining.

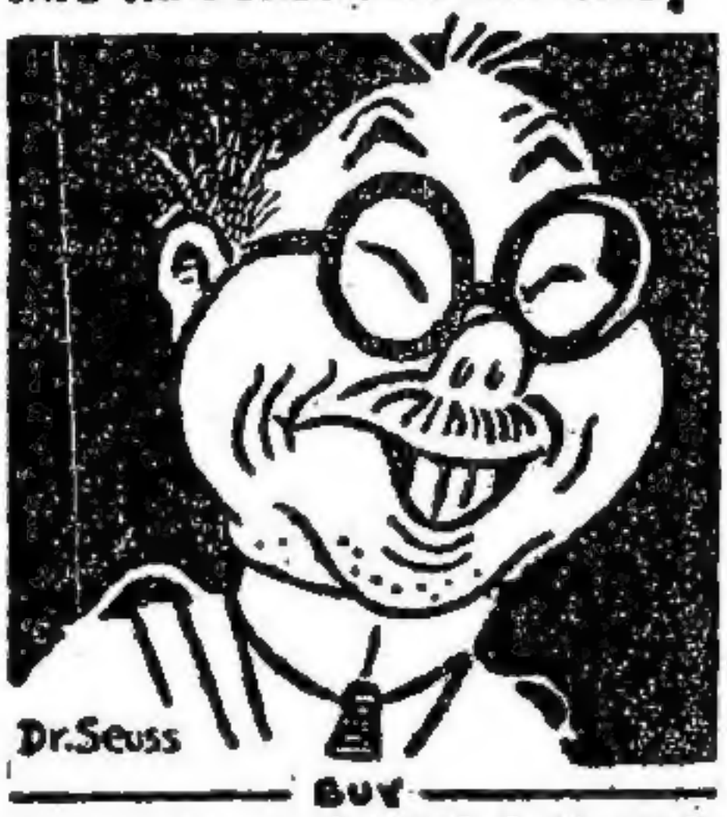
I notice that in another letter someone disliked the "Serum Rubber Man" story. This may have been just a personal reaction, but it seems that there are a few readers who don't like anything like that. Their stories must be "Blood and Thunder" and race along like a freightened thunderbolt. Kindly keep up this character series of Doodle and Plast.

Another strange letter was furnished by Tom Pace. So he is afraid that some vampire will eradicate M. W. Wellman, huh? Tsk. Tsk. After all the experiments carried out by Houdini, Dunninger and Edison there are some people still superstitious.

Incidentally, somebody needs a pat on the back for the excellent way the illustrations are arranged. Donnell for the novel, Morey for the Hall of Fame

*(Continued on page 104)*


WIPE THAT SNEER OFF HIS FACE!

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Frontier Asthma Co. 437-N Frontier Bldg.
462 Niagara Street Buffalo 1, New York

An explosion sounded in Len's ear and the spy dropped the light (CHAPTER VI)

# IRON MEN

## By NOEL LOOMIS

***Fleeing from the Cruel Masters of a Dying Earth, Len Niles, Champion of a Vanishing Race, Sails a Space-Ship into the Void on a Strange Quest for a New Planet!***

### CHAPTER I

*Revolt of Silicon*

IT WAS plain Len Niles was in no mood to listen to suggestions. He had slouched down further into his seat and compressed his firm lips into a stubborn line.

"The fact is, I don't want a new pair of shoes," he said. "These are only three weeks old and they aren't even scratched. They're just getting comfortable."

He stretched his long legs and put his feet on the table-top. Through the flexiglas it was apparent that he was luxuriously wriggling his toes.

AN AMAZING COMPLETE FULL-LENGTH NOVEL

"That is beside the point," said Fred Niles, shaking his dark head. "You haven't used up your quota card for this month and so you have to take a new pair of shoes."

Len Niles relaxed in the deep glass cushions. "If only they didn't change styles every month, I could fool them."

"But they do," Fred Niles answered. He looked closer. "The nail on your third left toe is too long."

"I know," said Len. He opened a glass case and a hydroponic cigarette popped up. Smoke began to curl from its end. He lowered his voice carefully. "Just between the two of us, I haven't been taking the nail-inhibiting factor," he said. "I thought it would be fun to trim them by hand." He took the cigarette thoughtfully. "That's the trouble. Things are too certain. We're growing soft. Take these cigarettes, for instance. Have you ever seen one fail to light?"

"Once," said Fred. "When I was small."

Len bounced up and paced the pink glass living-room. "Wouldn't it be fun if these things failed to work about half the time? What would we do then? How would we light them? If I had my way—there's the chime."

"From the sound it must be Mirl," said Fred. "About his size, anyway."

The two of them, in orange shorts and tunics, went to the door, their glastic clothes tinkling faintly as they walked. A section of the wall slid up silently, and the ascending stair deposited a man of pale green skin that, strange to relate, rustled slightly under a pink tunic as he came in.

"Greetings, my semi-silicon friend," said Len.

"Hello," Mirl said.

"What's the matter with you?" asked Fred. "I've been talking to Jebek."

"Hm," said Len. Seriousness came into his bronze face.

"He says the Regulating Body is going to demand that you Nilesmen prepare to start the process of changing the Glassmen back to carbon instead of silicon."

"It wouldn't take many generations to do that," said Len. "The silicon attributes would be lost quickly if they stopped the hormone treatments and eliminated the sun-power catalyst from their diet. But it can't be done now."

MIRL grew impatient. "We're too restricted," he said angrily. "For instance, we can't leave the City of Glass for any length of time. The sun-energy batteries won't keep us going more than a few hours."

Len was troubled. "I know how you feel." He sat down and crossed his bronze legs. "You are a Pale Green," he said. "You're already halfway back to carbon."

"It's a matter for the entire race," Mirl said, exasperated. "The whole world's population of Glassmen—twenty-five hundred persons—is involved. Why don't you give in? It won't hurt the Nilesmen."

Len brought out the tinted cigarette case. "Have one?"

Mirl sighed and reached with his greenish hand. "We want to be white, like you," he said.

"I'll bet you one sando against a hundred it will light," Len said to Fred.

"You're not taking enough odds," Fred observed sourly, "but if I should lose—" He brightened.

The cigarette popped out and glowed red. Len handed him a white glass coin.

"Thank you," he said, and Fred scowled.

"You know—" Mirl began.

"Wait," said Len. He sprang up. "Here's the situation. For thousands of generations the Glassmen worked to change to a silicon economy, because nitrogen, necessary to utilize carbon in the body, was disappearing from the earth."

"But your own great-grandfather thought up the idea."

"Yes. Hart Niles had to use some of the precious nitrate deposit for explosives to protect the City from the Cros. He built the machinery that fixed nitrogen from air, to assure perpetuation of the Glassmen until they could adjust themselves entirely to silicon. At that time, even after three hundred thousand years, only two per cent of their body needs were furnished by silicon. Now, the figure is one point seven. A dangerous trend."

"But we want to get away from silicon," Mirl protested.

"The time is not yet," Len said patiently. "There are two reasons. One is the fact that the race would be dependent on machinery—and our knowledge of iron and steel is not yet sufficient. The other is the lack of fuel. If we had not had to seal up the caverns of the Cros, it would be different, but our present source will last not longer than two hundred years. The only other coal mine is three thousand miles from the City." He stopped and faced Mirl. "Do you know what that means?"

"I suppose not."

"It means that it would take more fuel

The ship gave a heavy lurch which threw them all in a heap (CHAPTER XI)

for going and coming alone, than we could transport," Len said heavily.

"We have atomic-power engines."

"The City of Glass has produced, in the last hundred years, twenty-three thousand grams of U-Two-thirty-five—fifty pounds," Len said. "Less than one-fourth enough to furnish transportation power for one year."

"At least we have sunpower," Mirl said doggedly.

"We've never been able to turn sunpower into motive power efficiently," Ken said wearily. "With the best methods so far developed, we couldn't supply more than half of one per cent." He stopped, and the faint vigorous tinkling of his orange tunic ceased. "If we could develop a method of doing that job, then the change could be safely started. But until then, I will oppose it."

Mirl stiffened. Again his pale green skin rustled audibly and then was silent. "You Nilesmen are the ones who have the technical knowledge necessary for the change, but if you're going to be stubborn, we'll see what the Regulating Body says."

Len eyed him steadily. "I don't like to hear you talk that way, Mirl. You've been our best friend among the Glassmen. I thought you would understand." His jaws tightened for a moment. "The future of the City is vital to me as well as to you. If Kardox decrees the change, I'll still fight it."

But Mirl's face was set in diagonal lines. "If you won't obey the Regulating Body, you will be sent Outside," he said.

Len and Fred looked at each other after Mirl left. "It looks as if you'll have to work for them," said Fred dourly.

Len Niles snorted. "Do you think that worries me when the solar system is about to be wrecked and the earth itself made into an interstellar graveyard?" he asked.

SOON after this Len Niles dismissed Mirl's ominous warning from his mind and went to bed.

The next morning, when Len Niles opened his eyes, he lay quiet for a moment, waking up. Then into the focus of his vision came the ceiling. Half asleep, he checked the dials idly, as he had done every morning for two weeks now.

A spot of light glowed at the figure eight on the red dial, another at nine on the blue dial, at three on the brown, two on the yellow, three on the green, and two on the violet.

"The year eight hundred and ninety-three thousand, two hundred and thirty-two," Len checked off, and went on. "One hundred and first day, seventh hour, fourteenth minute, and eighth second." He sighed and burrowed deeper into the bed. "Some day," he thought cheerfully, "our time-keeping mechanism will go sunspotty, and then there will be excitement."

Suddenly his mind cleared. He bounded from the spun-glass mattress.

"Mother!" he called. "This is my day to work. Vacation is over."

His orange-colored tunic and shorts tinkled faintly as he jerked them on. The glastic was just ductile enough to make the garments fit snugly. Len Niles went to the door in a bounding stride.

A small white-haired woman smiled at him. "I wish you wouldn't be so energetic, Len. The Greens already have given you demerits for working too hard."

"But, Mother, I like to be active."

She laid a thin hand on his hard young arm. "You are so young," she said softly. And then, "Fred saw Mirl again, and Mirl blames you for all the trouble the Pale Greens are having with the Greens."

"But Mirl is our friend."

His mother looked up at his tousled light hair and into his clear blue eyes, and shook her head gently.

"You're as irrepressible as your great-grandfather, Hart Niles," she said, and studied him sadly. "We Nilesmen in the City of Glass are few in number. The three hundred of us now living are the closest descendants of a species that once ruled the earth, that numbered, Len—think! Over two billion persons!"

The world that had supported incredible numbers of humans, the world that his great-grandfather had left eight hundred thousand years before on a flight through the galaxy at the speed of light—all this had been told and retold until it was, like the legend of oil, known word for word by every Niles child.

"When I was a young woman," his mother said, "Grandfather Hart said that some day the Glassmen would resent our presence."

"But he saved the City of Glass" Len protested. "If it were not for him, the human race would be extinct."

But his mother's eyes were weary. "He said that if we are to survive, we must not forget that we are only visitors in the City of Glass." She turned a little, and her glass dress shone with its traditional checkered colors.

Len put his arm around her shoulders. "I'll be careful, Mother." His voice was very gentle. "I'll try not to antagonize them."

BUT he could not entirely control his eagerness. The problems of iron and steel were waiting for him. The great nitrogen-fixation machines, deep under the City of Glass, were wearing out.

"They should not have hampered the work in iron after Hart Niles died," said Len Niles.

"What would happen if the machines stopped permanently?"

"Nothing—for a few generations. But we should have to go back to the nitrate deposit under the City. And since a great portion of that was used to make gunpowder, there is not very much left. The hydroponic gardens would die out and the City of Glass would starve to death. We Nilesmen would not have a chance, and the Glassmen would not now have time to finish adjusting their body economies to silicon instead of carbon. For that matter, they have slackened their efforts so much that already the artificial characteristics they had before Hart Niles came, have almost entirely disappeared except for their green skins. Suppose the machines should somehow be destroyed?" he demanded.

"Doesn't iron last forever?"

"It lasts, yes, but it wears—and it breaks often when it shouldn't. It takes good metal—the best metal possible—to keep that machinery working right."

A soft whistle from the pneumatic tube announced his meal. He carried the tray to the table.

"The falcon-meat pie looks good this afternoon," said his mother.

"I'll save it till the last," Len decided. He ate the tasteless vegetables. "We'd be all right if the iron-making formulae left by Hart Niles hadn't been lost. Since we've started to make steel again, it doesn't hold up. There are impurities in it that I can't seem to eliminate. There must be something we could use to cleanse that steel."

He finished the meat-pie and ate his orange.

"There was a breakdown again yesterday. The drive-wheel shaft on the main compressor twisted in two. I wasn't supposed to be working, but I slipped down to examine it." He frowned. "There was a spot in the center of the shaft where the steel had crystallized improperly. It's the same with all the new parts we've been making. Can't depend on them at all."

"I'm sure you can find the answer if anyone can," said his mother.

"If they let me," said Len Niles. "They surely realize what has to be done, but still they won't let us work at it." He arose from the pink glass table and kissed his mother quickly.

"I'm off," he said, "and I'll be careful."

## CHAPTER II

### *The Brawn Trust*

LEN NILES rode the moving stairway to the street, entered a magnetic car, and shot between the tinted glass buildings to a peach-colored dome. A frosted panel raised before him, but he couldn't wait for the slowly ascending stair. He vaulted up the steps three at a time, and entered a door over which was a lighted legend:

CITY OF GLASS CHEMICAL DIVISION
Biochemical Branch, Inorganic Laboratory

By the glowing chronometer he saw that he was early and felt a moment of discomfort, remembering his mother's words. But then he was in a great room, in the laboratory itself, and the vast array of vacuum pumps, compressors, and multiple glass retorts at once caught his attention and stirred his interest almost to a fever. Man was made for this, to have his hands occupied with tools, his mind seething with questions, revolving, turning, and resolving into solutions. Len Niles took a great breath and stood without words.

Fred Niles came across the floor of the laboratory, dark-haired and slender, his orange-colored glass clothing giving off faint musical notes.

"You would have to show up early," he said accusingly.

Len Niles' eyes roved over the long benches. "You forget that I've been off for two weeks," he said.

Fred glanced behind him. His eyes were shadowed. "Things have happened, too. The Brawn Trust has just decreed there shall be no more studying during vacations." He looked straight at Len Niles. "They were watching you."

Len frowned.

"And they've cut our working time to one and a half hours a day—four days a week," said Fred.

Len was startled. "What do they think we are?" he demanded. "Can't a man keep busy at all any more?"

"Not so loud. They're watching everybody. Last week they had Bigyz in the laboratory. Noboy knew why. Of course we aren't sure exactly what he can see with

those infra-red ray eyes of his."

"That's bad, Fred—bad!"

Fred's face was dark and desperate. "The new overseer has decreed that there shall be no work during the rest period. There must be fifteen minutes of absolute rest in each shift. So long as everything we need is provided, he says there is no reason why we should work so hard."

"Hard!" Len Niles snorted, but he remembered to keep his voice low. "A man's brain will atrophy, like muscles, if he doesn't use it."

Fred sounded resigned. "They'll make Muscle Workers out of us instead of Brain Workers—unless you agree to convert them back to carbon."

Len hesitated. He reached for the hydropones and for a moment looked inquiringly at Fred.

"Not unless you take a thousand to one," Fred growled.

Len stopped. "Okay, then." He pressed the button. The cylinder popped out and smoke curled up. Ken gave Fred a sando, but he wasn't thinking about it.

Fred glanced at the chronometer in the ceiling. "They figure the Pale Greens in the Organic Branch can take over our work after a while. They've been putting spies in there to make trouble between the Pale Greens and us—just to be sure we don't get together on anything." He watched the door far across the room. "You'd better go. The eighth shift is coming on."

"The Pales can't possibly take up our work," said Len. "They're just beginners in chemistry. But there's one good thing about cutting down our hours. It will give me more time—Below."

Fear came into Fred's eyes. "That's more dangerous, too. We've got to hurry with that work." He moved nervously. "There's a meeting tonight, east wing of the nitrate mine, thirty-first level. See you then."

Len caught his arm.

"Will Avis be there?" he asked.

"Yeah."

Len Niles' eyes lighted. Fred Niles hurried away, and Len went to the dressing-room. The overseer, in a glass cubicle suspended from the ceiling, glared at him. "There's still twelve minutes," he growled, and his green skin rustled as he spoke. "What are you doing here, so early?"

Len Niles' eyes widened. "I've finished my vacation," he said. "I'm going to work."

"Well, take your time," the overseer ordered. "Nobody asked you to hurry, did they?"

LEN got into his flexiglas uniform and sat dejectedly on the bench watching the second-hand in the ceiling. His life was growing harder every day. Kardox knew the Nilesmen were filled with a constant, burning desire that had been handed down by both Hart Niles and Dr. Beckwith—the ambition to progress. And Kardox deliberately made it hard for them, knowing they had to stay and endure it, for out in the vast deserts that made up the entire known world, no man could long exist.

The deserts had been there two hundred years before, when Hart Niles had come to the City of Glass, but Hart Niles hadn't faced what the Nilesmen faced now in the City itself.

It was queer how things could change. Startling, even; if you went back to the very beginning of the trip that had landed Hart Niles in the City of Glass. Eight hundred thousand years before—in what the ancients had called 1942—Hart Niles and Dr. Beckwith of the bifurcated beard and his daughter, Carole, had left earth on a rocket-ship test-flight, got caught in the Fitzgerald contraction, and after almost a million years in space had landed again on Earth and discovered the City, built as a refuge from sunspot storms for the few people left on the planet.

They had found the City was erected over the last remaining deposit of earth's nitrate, and that the Glassmen, in a race against time, were changing their bodily economies to utilize silicon instead of carbon, because the use of carbon depended on nitrate.

Hart Niles reached them just in time to help defend them from the Cros, a renegade cavern-people from the south, and then showed them how to fix nitrogen artificially to prolong their limited supply of nitrate, so they could be sure the race would not die out before they could be converted to silicon.

Then Niles and Carole Beckwith married and founded a new race that came to be called Nilesmen.

The Glassmen and the Nilesmen were alike except for some characteristics imparted the Glassmen by silicon—chief of which was a green, crackling skin—and so the Regulating Body had decided the Nilesmen should remain as they were, depending on the hydroponic gardens for food, while the Glassmen, already a quarter of a million years on the road to silicon-people, should continue their course and try to become entirely independent of nitrogen.

But even though Hart Niles saved the City from the Cros and from the virulent

bitro and from premature exhaustion of the nitrate bed, friction had arisen in the following generations. As time passed, it had grown stronger and more violent, until now Len, Hart Niles' direct descendant four generations later, was fighting the Glassmen for freedom and even for survival in this city his ancestors had come to.

The Cros had been wiped out by disease. The caves, with their sickly plants, had been sealed forever with molten glass. The only vegetation now possible on the entire earth was in the City of Glass. Len knew that no man could long exist Outside.

It was well, then, that the work Below was reaching culmination. Without the hope held out by that work, the Nilesmen must assist at the extinction of humanity or they would be held to inaction that would destroy their abilities.

If they couldn't work, what would they do? A man couldn't sit around all day. There wasn't even any fun in betting on the magnetic car races any more, since the Regulators kept a record of every transaction and paid back every sando that was lost.

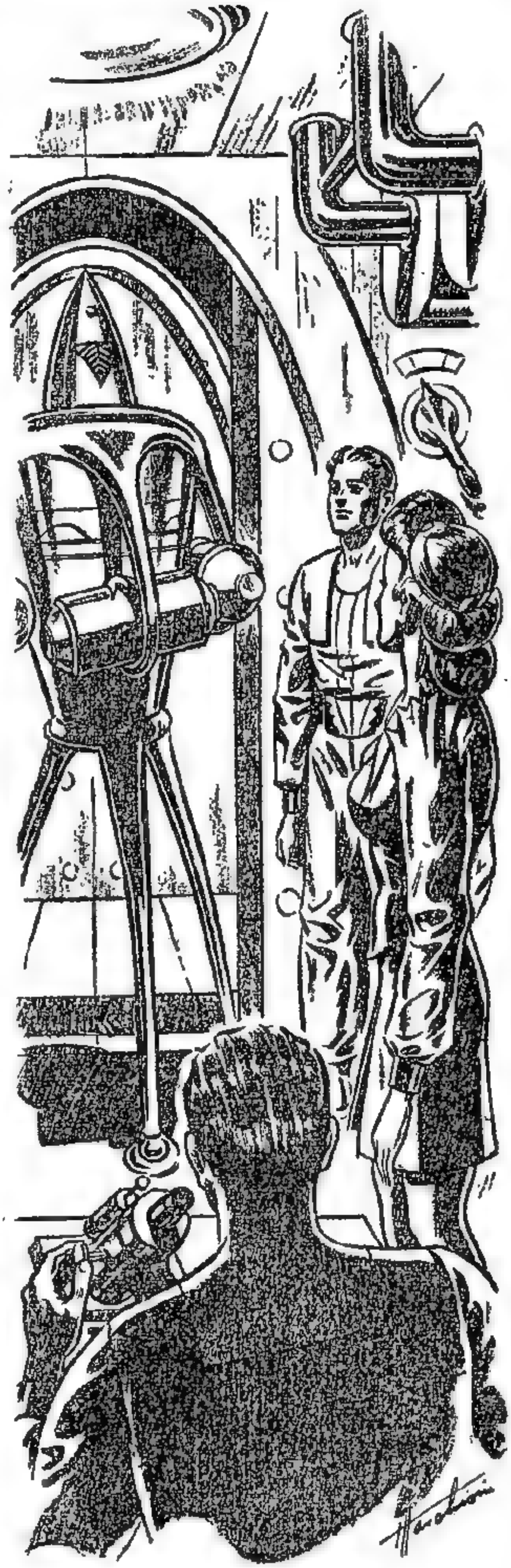
Len Niles' great-grandfather had said that in the earth he had left, everybody had worked at least eight hours a day and there never were enough sandoes and never enough time for a man to do everything he wanted to do.

There was plenty to do even now, but they couldn't work at it. The Glassmen wanted to be white of skin like the Nilesmen, but the nitrogen supply wasn't safe. Hart Niles had made the first fixation machinery himself, then Magrum died and the new Regulating Body resented the Nilesmen's white skins. They accused the Nilesmen of conspiring to keep them green. In a purge of Nilesman leaders they destroyed many of Hart Niles' original notes—among them the formulae for making steel.

The first machinery wore out and needed replacing, but no one knew how to make good steel.

The irate Glassmen accused the Nilesmen of intentionally making inferior machines. The Nilesmen answered that the Glassmen were at fault for destroying the formulae. They asked for more time to experiment, but the Glassmen said the Nilesmen would only use the time to better themselves.

Then had come a stroke from the skies. A few months ago, the observers in the Astronomical Dome had first reported a change of possibly vast significance in the earth's movements.



Len couldn't help seeing Avis write down his name
(CHAPTER VIII)

THIS aberration increased, became stronger, more pronounced, more ominous. Something, somewhere, was pulling the Earth from its age-old path around the Sun. Something was wrecking the solar system.

The outer planets were the first to go—Pluto and Neptune. Uranus and Saturn were driving off into the vast depths of solar distance. Jupiter was erratic. Mars was on the opposite side of the Sun and they were not certain of the red planet's behavior.

But of earth they were deadly sure.

Earth itself was following the path to outer space. If the Earth should go much farther, it meant disaster and violent death for those few left on the globe. And what was there to stop it? Was there anything they could do? What, anyway, was behind this whirling solar catastrophe? If they knew the reason, perhaps something could be worked out.

Len Niles saw the overseer staring at him and caught up his thoughts with a jerk. Some of those fellows, they said, could read minds. Old Simon, the father of Fred and golden-haired Avis, had been caught that way. He had rebeled when reading was restricted, and soon afterward they convicted him of treasonable thoughts. Old Simon had known more about biochemistry than any of them. It was he who had first pointed out the danger of attempted reversion to a carbon economy.

Len sat up straight and pretended not to see the overseer's stare. He looked at the chronometer, and started up when he saw the moving light was fifty seconds past his work-time.

"Half a minute late," he thought, and strode rapidly into the laboratory.

But a heavy hand fell on his arm.

"You don't have to beat Mercury around the sun," the overseer snarled, his green face yellow. "What are you trying to do, accomplish something?"

Len hid his resentment. "Not particularly," he said, gently. "I'm just trying to pass the time."

Seething with anger, Len went to his place at the bench in the long laboratory room. He lighted a retort mechanically, because he wasn't able to think straight at that moment and he wanted to get his hands busy so his mind would follow them. But the green face of the overseer was still at his side.

"What's your problem?" he demanded.

"The—ah—" Len hesitated. He didn't want them to know he was still thinking about iron. His eyes roved the columns of glass containers. Iron and its complex cyanides, the big manganese family, titanium and its carbides—something must furnish an excuse.

"The artificial creation of a sugar molecule," he said as if inspired.

The overseer laughed and his glassy skin crackled. "You know the Regulating Body frowns on flavor in foods. We real Glassmen," he said pointedly, "have never needed it."

"I know," Len said innocently. "But I want to earn my sandoes."

Scowling the Glassman turned away.

"Go ahead, then." He left, and Len looked around at Fred.

"I made a high albedo with that," Len whispered cheerfully. "He doesn't know the difference between organic and inorganic."

Fred scowled. "We won't get by with anything much longer."

"We can if we're careful."

"If they ever find out that you are really directing the work in the entire Branch, you will be banished into the desert."

Len Niles' hands were busy, but he grinned. "I'll have one chance in twenty-four to get into the underground laboratory alive," he answered. "That's good enough for me. I could work all I want to, then."

His mind operated like a magnetic shuttle. He pretended to carry through the experiment with sugar, while mentally he listed the equipment he would need for the next day—a small electric furnace, a quantity of ore, perhaps a little columbium or iridium to see what effect it might have on the product. Tomorrow they wouldn't pay much attention to him, especially if he should come in a few minutes late. He had barely assembled his apparatus for a first test in sugar when the chimes rang for the rest period. By the time he had brought the solution to a boil and had obtained a small vial of hydrochloric acid from the supply room, the chimes rang again for the end of the shift.

ONLY then did his enthusiasm drop. He looked at the apparatus and his open notebook, with not yet a scratch on its thin glass page, and his jaw tightened a little. He took off the apron, laid it in a drawer, and reluctantly started to put away his material. But the overseer was there again.

"Your time is up." His voice was like gritting glass. "The next shift will clean up the bench."

Len drew a deep breath and faced him.

"I always clean up my own bench," he said slowly. "We all do our own cleaning."

"The new rules are that you clean up your bench on shop-time only. I am giving you ten demerits for working overtime. That brings your life total to seven hundred and thirty. You go Outside on a thousand."

Len Niles' resentment boiled.

"Asteroids!" he said.

The overseer's face crackled in triumph. "Twenty-five more for insubordination. That brings your life total to seven hundred and fifty-five."

Len felt a surge of recklessness. He opened his mouth to answer. Then he saw Fred's slim hand raised to caution him as Fred put away his apron. Len clamped his jaw together. He went slowly to the locker-room. Rebellion seethed inside him. He was openly deliberate in changing into his orange-colored tunic. What if they did send him Outside? Only twenty-three out of twenty-four died out there. If they didn't take him too far from the City, and if they happened to take him shortly before sundown, he wouldn't be tortured by the sun and he might escape the wheels and the sun-eating flowering pancakes and the giant desert fungus. Perhaps after dark, he might even locate the entrance to the underground laboratory, and—he shrugged!

## CHAPTER III

### *Menacing Prospects*

BUT Len Niles was not spoken to again. He reached his pink-glass apartment and sank restlessly into a chair. His mother watched him quietly.

"Was it bad today, son?" she asked.

He nodded, staring at the wall.

His mother's eyes were damp. "Your father defied the Greens, and he was crushed by a wheel within a few minutes after they put him Outside." Her voice broke for a moment, and then she went on, very tired. "There are so few of us left, Len."

Len softened. "I'll try harder, Mother," he said earnestly.

He touched a button on the table. Fred's face appeared a moment later on the radio-visual screen.

"I'm coming over at fifteen hundred," Len said. "Let's go to the Black Dome." He was casual. "I think I've figured out a way to beat the Big Arena."

Fred nodded.

Len touched a button and turned to his mother. "The screen wasn't clear."

"It has been like that all week," his mother reminded.

Len frowned. "We've never had interference before. The City is shielded from all normal disturbances."

Fred was waiting for him. He looked up and down the glass street carefully. "I had a message from father," he said in a low voice.

"He wants to be sure you see him tonight. The earth's center of gravity has taken a definite shift, he says."

Len Niles eyes tightened. "We didn't expect that for two years."

"How much time do you suppose is left now?"

Len was sober. "A few months at most," he said.

Fred sucked in his breath and then the corners of his mouth turned down. "We might as well be dead, anyway—the way we're living," he said morosely.

They stopped a magnetic car and got in. They flashed high above the quiet street and between softly glowing buildings of pink and green and yellow and orchid.

"I wonder if Mirl will be at the meeting tonight," Fred said once.

Len pressed a button and the car stopped silently before the Black Dome. They rode the platform to ground level, stepped on a wide crystal escalator and were carried through the great entrance to the Black Dome.

"Crowded tonight," Len observed hopefully. "Do you suppose somebody's losing?"

"Not a chance," said Fred.

They registered at a small desk in a huge, brilliant lobby.

"You're Nilesmen," said the Glassman, his eyes darting over them. "Any weapons?"

Len bristled. "Of course not."

They rode on through the lobby. The moving walk took them into a room filled with soft music and the rustling of Glassmen's skins.

"Since they learned to make alcohol, the Curved Light Room has been the most popular place in the City," said Len.

Fred's dark head shook dolefully. "I don't like it. You can't even pay for them."

"Nevertheless we need a drink," Len said firmly.

He stepped off, and Fred followed. They moved in between a Glassman in the peach-colored tunic of Administration and another in the green tunic of a guard. Len put his foot on the glass rail.

"A Sizzling Rocket for me," he said cheerfully.

"Me, too," said Fred, and his dark eyes lighted a little.

But the Glassman in the black tunic shook his head. His neck crackled.

"Sorry, gentlemen, I can't serve that drink today," he said.

Len frowned. He looked down the bar and across the room at a golden-skinned Glasswoman sipping a drink.

"I see a couple of them."

The barman hesitated. There was a rustle at Len's back, and he turned. Mirl, in the pink tunic of the Organic Laboratory, held a drink in his pale green hand.

Mirl was a little unsteady. His green face was flushed with dull red.

"You Nilesmen can't have these high-powered drinks." His voice crackled huskily. "It's a new ruling to save trouble."

HE LIFTED his own drink high. It was in a deep, narrow glass, of invisible crystal. Little fountains of light—orange, red, and yellow—shot up through the ambent liquid and burst like tiny comets just above the surface. Mirl turned it in his hand and then took a deep drink.

Len Niles' eyes became narrow. His right arm drew back, his fist clenched. But Fred jumped in front of him.

"You don't want to go Outside, do you?" he muttered.

Len drew a deep breath. His arm slowly straightened, but he glared at Mirl.

"I can give you a Desert Pancake," the barman offered.

Len stared at him. "I've just discovered that I'm not thirsty," he said. He stalked away.

They rode the walk to a high-ceilinged room where the walls glowed with a soft pink light that tempered even the harshness of the Glassmen's skins.

"It's crowded," said Len, "but I don't see any Nilesmen."

"Some Pales," Fred observed. "But they're getting to be as bad as the Greens."

Len shouldered a way among crowded tables to the Big Arena. Two Glassmen, having won at least twenty-five hundred sandoes, got up disgustedly. Len and Fred sat down at a wide, transparent table. Its thirty feet of length was filled with players on both sides.

"Let's just play a sando at a time and watch for a few minutes," said Len. "That way, we can't win much." He opened a notebook and placed one sando. He watched the table and the plays and tabulated results.

The table slanted down toward the middle. Through its center were five big wheels, each marked off in one hundred sections tinted in different colors. The wheels whirred, and ten glass balls, each a different color and glowing with soft light, were whirled around the rails by magnetic force, and almost at once became little colored comets chasing one another.

The operator, suspended in a glass cubicle over the center of the arena, touched a lever. The balls lost their magnetism, continued their orbits for a moment against the retaining wall, and then began to flash erratically across the table, and finally trickled into the slowly revolving wheels. The wheels came to rest, the balls stopped their bouncing and dropped into holes at the edges of the disks. One ball, a yellow one, lighted up.

"Yellow on blue-green, Number Four, pays five thousand to one," announced the operator. "Better luck next time, sir." A Glassman groaned, and the players were politely silent. For a moment there was not even the rustle of a movement, then came the operator's voice.

"The more you play, the more you lose."

Len watched the game for ten more plays, making rapid calculations, and playing just enough to hold his place at the table. By that time he had won about twenty sandoes, and Fred was scowling over a stack of forty. Len took a deep breath, pushed out a nitrate disk and punched nine of the lighted buttons before him with great care.

The operator looked down at him.

"Twenty sandoes on a five-way, all-spot book," came his rasping intonation over the intervisor. There was a hush around the table. "White on red, blue on purple, red on green, orange on white, and black on red. All balls to light, which means each ball must stop on its selected color in a predesignated wheel." He glanced at a chart. "It is my duty to warn you that a win pays eight hundred thousand," he said.

There were groans from the table, but Len nodded grimly.

"With my luck," Fred growled, "I'd win even that one." But he followed Len's bet, to a crackling eyebrow-lifting from the operator.

The wheels spun, the balls whirled, and they lost. Len grinned happily.

"I've got it now," he said. He consulted his figures and placed a half-disk on a five-way book. The Glassmen around the table were silent except for the crackling of their necks as they watched.

FRED was morose.

"If we win, we'll never get rid of these sandoes."

"We won't," said Len. "I'm dropping the bet, you see. If we're lucky, we'll get rid of the entire period's credit."

"I hope so. There's nothing else to do with it. But the odds are figured so you can't lose."

But within three hours Len was beaming, and Fred had softened up. They had each lost eight hundred of their thousand sandoes for the period.

At one play they won a payoff of sixty thousand, but Len had resolutely doubled the bet and increased the odds until his winnings were gone, and Fred had followed him until he had finally got his breath back.

"From now on we'll have some fun," Len said, scrutinizing his figures. "I've got a system." He heard the intonation of the operator, "Put your sandoes on the table. The more you play, the more you lose," but Len shook his head.

"Quitting when you're behind, eh?" said a rasping voice at Len's elbow. "It won't do you any good. Every play is recorded on the calculating machines, and all you lose is re-posted to your credit at the end of the period."

Len frowned abstractedly, then looked up with a start at a golden-tunicked Glassman who was scanning his notes. Len straightened as the meaning of the words came to him with full force.

"Jebek," he said slowly and distinctly, "I well know that you are the younger brother of Kardox, but you are exceeding your position."

Jebek smiled, but his green eyes glinted. "You will do better to watch your tone."

"The Regulating Body has no right to interfere with the pleasure of the citizens unless some one else is injured," Len retorted.

"A laboratory lawyer," Jebek sneered.

"If I want to lose my credit, that is my business," Len said evenly, and got to his feet.

"It is against the law," Jebek said coldly.

"It should not be," Len said distinctly. "I have no need for credit. My physical wants are taken care of, and I cannot buy books. What good is credit? Our only recreation is in trying to dispose of it."

Play had stopped at the arena. The players, in many colors of tunic, were motionless and silent, their green necks twisted.

"You criticize a ruling of the Regulating Body," sneered Jebek. "Next, you will be demanding an election to fill Simon's vacancy on the body."

"Why should we not." A flat statement.

"And I presume you will be the candidate," Jebek went on.

"I have not considered it," Len answered evenly.

"Then don't." Jebek's voice was raspy.

Len Niles' eyes were narrow. His left hand tightened on his notebook.

"We are unarmed," Fred reminded him in a low voice.

"Is it important whether Aldebaran's magnitude is one and one-tenth, or one and nine-hundredths?" Len asked Fred, his eyes on Jebek and his voice cold.

Fred grew pale, but a Glassman came into the room and hurried up to Jebek.

"Kardox wants you at once," he said. "The black spot has covered the constellation of Hercules and the solar drift has accelerated doubly in the last forty hours."

Jebek's lips grew thin. He wheeled, his skin protesting, and pushed through the crowd, followed by the peach-tunicked messenger. The whir of the glass balls signaled the start of play on the Arena. The Glassmen turned back, began to place bets and finger their indicator buttons.

Len and Fred left quietly.

"So they know it, too," Len whispered. His voice was hollow. "The pull must have grown suddenly. At the last report from Simon, you said—"

"You would have to pick an argument with Jebek," Fred answered sourly. "Not just a member of the Regulator's family, but a brother of Number One. Do you want to go Outside?"

Len was sober. "There's one chance in twenty-four."

"You've forgotten that no person who has been sent out alone has ever escaped," said Fred. "But why worry?" His voice was harsh. "The way things are going, the whole solar system will be smashed up before long, and these troubles won't be as important as the diameter of Umbriel."

## CHAPTER IV

### *Thirty-Fifth Level*

FRED and Len stopped at the desk to register out. The Glassman looked up and his face crackled in a smile.

"Lucky tonight, gentlemen?"

"Yes," said Len.

The news had spread fast. A party came from the Curved Light Room, and a golden-skinned Glasswoman spoke in an admiring whisper.

"They just lost sixteen hundred sandoes. I wish I knew their system."

They rode out quietly. "It isn't so good," Len said. "We'll be marked men for days."

Instead of taking a magnetic car, they turned in the direction away from the Golden Dome of Regulation and walked rapidly.

"Why not ride?" asked Fred.

"It's risky. The load would show on the new supersensitive oscillators. We can't take a chance tonight."

After four blocks Len stopped before a viewing globe and pretended to adjust his tunic.

"Over-suspicious, aren't you?" asked Fred.

"Ha, the sun calls Halley's Comet a fireball," Len said. He straightened and revolved slowly before the globe. "There were two Glassmen following us. They've stopped behind a corner a block back."

"Maybe it's a holddown," said Fred. "Maybe they're the ones who won twenty-five hundred, and they want to get rid of them."

"I hope it's no more than that."

He grabbed Fred's arm and they went down a street to the right, turned right again, then left, and finally wound their way back toward the Golden Dome. They rode up the high steps and Len spoke crisply to the guard.

"Inspection of machinery," he said.

The door slid up. They were in a long hall of frosted, glowing, vari-tinted floor and walls. They stepped onto the waiting-plate. Somewhere a chime sounded, then a golden glow skipped upward along a column of tiny white bulbs. The elevator-doors opened.

"Thirty-fifth level," Len said.

The Glassman glanced up. "Is the nitrogen machinery breaking down again? I just took a party down there."

Len took the package of hydropones from his pocket. He looked at Fred, but Fred scowled and shook his head. Ken offered one to the elevator operator as the floor suddenly dropped under them. The operator reached eagerly.

But Len held up his hand.

"Hold a minute. I'll bet you one to a hundred it will light."

"Oh, no," he answered immediately, but then, "One to a hundred?" His eyes began to glow. "I saw one fail, once. I'll take it."

The hydropone popped out. Smoke curled up. Len satisfiedly gave the man a sando.

"Yes, we have had some trouble with the fixers," he said, casually. "But we'll get it straightened out pretty soon."

The elevator dropped. The throbbing of the big machines began to come to them from the bottom level of the mine, where their depth kept all noise from the quiet city above. They left the elevator and stepped into a giant room with walls of gleaming white crystals. Down here it was a relief from the always silent City above. The floor was filled with rows of big machines, whirring, pounding, sucking in air through a huge tunnel that came from the desert Outside, compressing it to one thousand atmospheres, passing it over an osmium catalyst, and collecting gaseous ammonia as the final product.

They walked among the machines and entered a tiny elevator that took them to a glass cage high in the center of the fixer-room. The superintendent, a Nilesman, shook hands with them.

"I'm glad you came down," he said. "We'll have to start using uranium as a catalyst tomorrow. The osmium has been used so long we've lost too much for effectiveness."

"Uranium?" Len frowned, thinking deeply. "How's the store of iron and molybdenum?"

"Plenty of iron," the man said in a worried voice, "but no molly."

"Don't use any more uranium than you have to," Len said. "We may need it—later."

THE man looked at him and nodded.

"Is the way clear?" asked Len.

"Yes. I've got all the men working on that compressor shaft at the other end. It froze up again."

"Then the oil we made from asparagus didn't work."

"No. I think we'll have to go back to sulphuric acid."

"Hart Niles spoke of a mineral oil, but we've never been able to find that."

"The acid is a good lubricant—and non-corrosive, if it's one hundred per cent pure."

"Okay," said Len. "I'll start the laboratory on it tomorrow."

He and Fred went down through the machinery into an old store-room, at the back of which Len moved a lever in the dark. A small section of the wall swung open, and they went through.

They were in a high, narrow passage cut from solid nitrate. It was dimly lighted, but the white crystals gleamed and glittered dully all around them. They started up a long, spiral incline. There was no dust on the white floor, though the mine hadn't been worked for a hundred years, and was now

only a reserve held for future use.

"I wish we were rid of Mirl," said Fred in a low voice. "He's the only Glassman who knows about this."

Len Niles made no comment.

"It used to be fun, but it's getting dangerous now," Fred went on.

"I'm afraid you're right," said Len. "Here we are—thirty-first level."

They turned down a dark corridor and presently came to a door marked with ancient lettering, "Foreman," visible only in far-reflected light against the white nitrate crystals of the passage.

Len stopped and held up his hand to caution Fred. They stood completely silent, watching behind them. Then Len pressed a button in the wall. A moment later the door swung in and soft light flooded the corridor. They went inside quickly and the door closed behind them.

"Hello, Len," said a quiet voice.

Len looked at the girl. Her blond hair shone softly at about the level of his shoulder. Her pink glass shoe-heels caught the light as she stepped forward and looked up at him.

Len's eyes lighted. He caught her briefly by the elbows.

"How are you, Avis?"

"I feel as good as you look," she said, not taking her eyes from his.

"Swell," he said, and shook hands with Walter, a dark, slender boy who was a younger and smaller copy of Fred.

"Something's got to be done, fast," said Walter.

"Pluto still waits for warmth," Len reminded him.

There were six other Nilesmen in the small room. Len shook hands with them all and they waited for him to speak. He produced a package of hydropones.

"Not me," said Fred sourly. "I've already won too much from you."

"Let's get to business," said Walter impatiently. "The rest of us don't know much about this danger to Earth."

"None of us really know much about it," Len said soberly. "Except that the entire solar system is being torn apart by some unknown force. Unless something intervenes, the Earth is certain to be destroyed, or at least to be thrown into the cold and darkness of outer space where life cannot exist." He looked at Avis and drew a deep breath. "The trouble now is that this is coming to a climax much sooner than we thought it would."

"If we could make a space-ship, the Nilesmen—or some of us—could leave the Earth and hunt another planet, somewhere in the universe," said Walter.

Len shook his head. "And leave the City to itself?"

"Why not?" demanded Walter. "What have the Glassmen done for us?"

"We have some friends among the Glassmen," said Len. "Don't forget that Aldo is on our side, and he is descended from Perso, who many times saved Hart Niles."

"That's all in the past," Walter argued. "It's every man for himself now. We've got to be practical."

Some heads nodded, but they waited for Len Niles to answer.

"I don't favor practicality above humanity," Len answered. "However—"

HE STOPPED. The lights dimmed and then came back. Len looked around.

"Who isn't here?" he asked sharply.

"It must be Mirl," Fred said glumly.

Len Niles frowned. Walter jumped up.

"That tenth moon of a tenth moon," he said. "I'll take care of him."

"Sit down, Walt," Avis said quietly, and Walter sat back slowly.

"We'll have to let him in," Len decided. "If we keep him out, he might report us for

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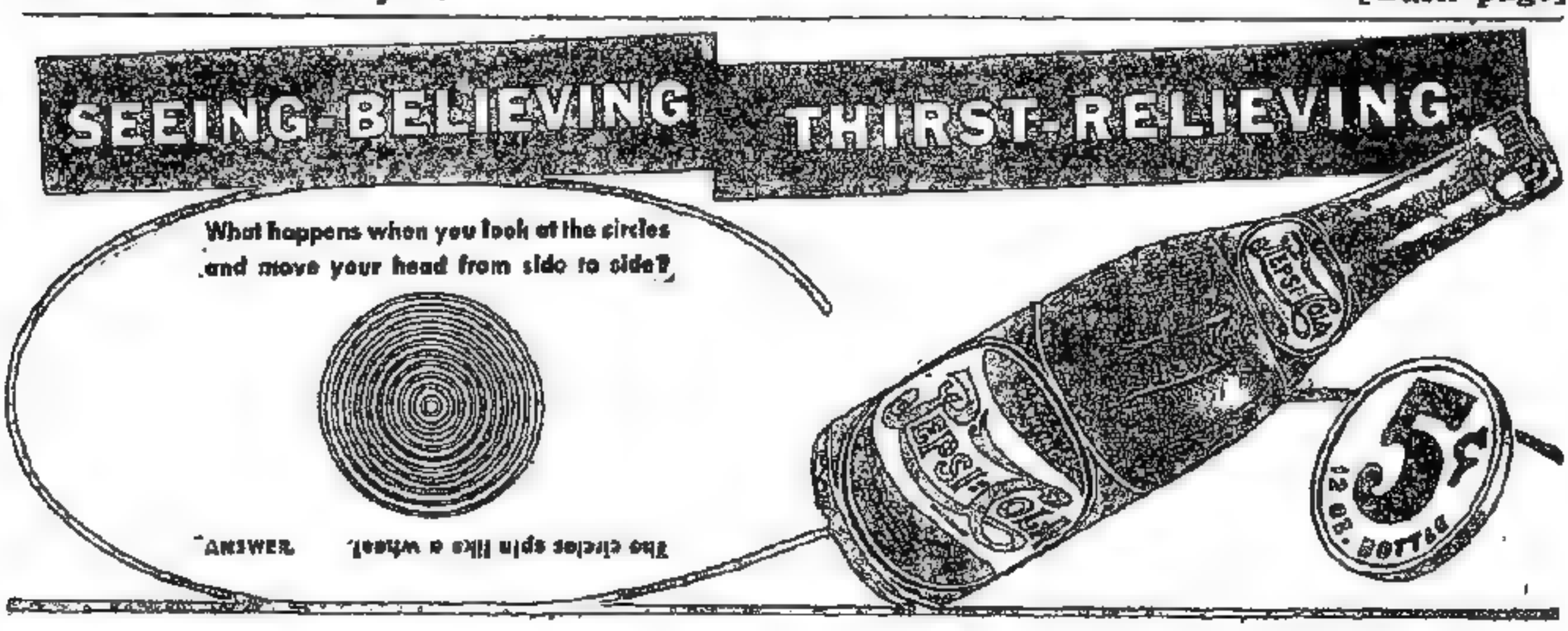

holding a secret meeting." He looked around at them. "Be sure that no word of a spaceship gets out." He went to the door

Mirl lurched in as it opened. His pale skin was more red now than green. He smelled heavily of Sizzling Comets, and his speech was thick. "Jus' ol' friends having a little convention. Don't mind me, folks. . . I feel at home here. I'll just have a seat an'—an'—lishen." He waved at them. "Go right ahead with your business."

He waved toward a chair and sat down heavily.

"Well, what you waiting for?" he demanded. "Something secret going on?"

"It's business for Nilesmen," Walter said sharply, before Len could stop him.

"Oh, ho." Mirl leaned forward and finally fixed his gaze on Walter. "An unborn planet in the system, eh?"

"I'm almost as old as you are," Walter said hotly.

"Walter!" said Avis, and Fred moved toward him, but Walter could not be stopped.

"We didn't ask you to this meeting," he shouted. "You came down here to spy on us and report to Kardox!"

## CHAPTER V

*Mass*

SWIFTLY Len Niles was on his feet, but it was too late. Mirl's face turned a brilliant green.

"I thought I was a friend of the Nilesmen," he muttered. "You treat me like a runaway asteroid."

"I think we'd better break it up until this internal combustion has a chance to expend itself," said Len. He tried to talk calmly, but his words were clipped a little for he was anxious to get the two men separated.

Mirl managed to get on his feet. He waved at them in a supreme gesture to recover his dignity.

"It's okay," he said. "I can't stay long, anyway."

He weaved to the door. There was nothing they could do. The Nilesmen gathered around Len and watched Mirl until the door closed behind him.

"Walter!" Avis was much worried. "You've upset things now."

"I don't care." Walter's voice had an acid note. "He's a green rat. He'll tell on us as soon as he gets up Above." He stood in the doorway. "I'm going to follow him. If he tries to tell, I'll fix him."

"Come back here," commanded Fred, and started for him, but Walter got away fast.

"One of you had better follow Walter," said Len Niles. "Try to keep him out of trouble."

"Do you think Mirl will talk?"

"I don't know," Len said. "He never has, but now he has been insulted—and he's drunk. Who can accurately predict the return of Halley's Comet? Anyway, let's find our respective orbits."

They returned to the fixer-room. Len took Fred and Avis to the superintendent's cubicle until the others had gone Above. Then, while the superintendent covered their exit, they went down glass steps into the pit under one of the machines, and soon were in a tunnel so steep they could not have walked at all but for the steps which had been cut in the nitrate.

"It seems dangerous to leave through the fixer-room," said Avis.

"It's quite safe unless some one suspects us and keeps watch. There are more machines than men, and the men are kept pretty busy. So, with ten different exits, we won't be noticed.

They descended eight hundred steps, several times coming to what appeared to be the end of the tunnel. But each time Len found a white button somewhere in the wall, pressed it eight times fast and one time slow, or seven fast, one slow, one fast—the order always varied—and the end of the tunnel would open.

The last door let them into a long, low-ceilinged room. Less than a dozen men, most of them well past eighty, were quietly at work at the tables and benches. The ceiling here was of nitrate, but the floor was cut from solid rock.

From behind them came steps. A small man, wrinkled and gray-haired and bent-shouldered, hurried to them.

"Simon," Len Niles said, and shook hands warmly.

"Father!" said Avis.

"Len, I'm glad to see you." The little man shook hands with Fred and kissed his daughter. "Avis, my child, you are beautiful," he said huskily.

"I've grown up in the last two years, Dad." Her eyes were moist.

"How are you getting along?" asked Len.

"Well enough with the men we have," said Simon.

"How is Ben?"

"He's well again. He does all right for a man of a hundred and twenty," said Simon.

"I don't know what we'd do without him. No one else knows as much about the atomic-power engine."

"You all do well," Len said emphatically. "With only ten men, I don't see how you get so much done."

"We work sometimes twenty hours a day."

Len Niles's blue eyes brightened. "I wish we could do that."

"It's all we have to do, except try to rescue others from Outside," said Simon.

Len's face became grim. "Keep a lookout for me," he said.

Simon took them into his office behind the door through which they had come.

"Fred said you wanted to see me," Len suggested as they sat down.

"Yes."

THE old fellow leaned back in a big chair that would have held three of him. They all waited. Old Simon's eyes took on a harassed look. He put his fingertips together.

"There is an unknown body of great mass which seems to have swept in from the outer reaches of the universe," he said. "It's come between the solar system and the constellation Hercules. In effect, it's cutting us off from the rest of the galaxy."

Len Niles' eyes were on the viewing-sphere, watching the outer door. Now he offered Simon a hydropone.

"A hundred to one that it lights," he said.

Simon looked amused. "Is it the same principle?" he asked.

"Yes. A speck of treated phosphorus that burns for a second when it pops out of the vacuum package."

"If I may see it?" said Simon, leaning forward. He held the package close to his eyes and examined it.

"I'll take the bet, he said, his eyes crinkling. "No, let me do it."

He took a deep breath, pressed the button, and a cigarette popped out before his nose. A tiny curl of smoke came up. This lasted for a few seconds then—died. The hydropone was unignited.

Fred's eyes opened wide. Len watched closely.

"Asteroids!" he finally said, and reluctantly took the five nitrate disks.

"They're no good down here, anyway," said Simon. He smiled as he handed the package back.

Len pretended to be casual as he put the package in his pocket, but he was eyeing it closely.

"Where did this unknown body come from?" asked Avis. "Do you know?"

Simon shook his head. "It must have been present somewhere in the cosmos, in the vicinity of the solar system, since the infinite beginning of time."

"What do you mean by 'vicinity'?" asked Fred.

Simon smiled at him. "Oh, within a radius, say, of a hundred or two hundred parsecs. There is evidence to confirm this theory—discrepancies that have always puzzled astronomers. The black bodies, for instance."

"What are black bodies?" asked Avis.

"Something that has, from primitive time, caused mysterious black spots on photographic plates. According to Hart Niles' notes, the best theory in the old days of Earth supposed an absorbing material somewhere near the center of the stellar galaxy—but I believe that perhaps this unknown body may be the answer. It must move at terriffic speed and change its position constantly. Just now it is approaching much closer than ever before—within a few parsecs, I would say. That would explain things—even the televisual disturbances which you must have noticed lately."

"I'm sure that isn't your only basis for postulating an unknown body of great mass," said Len Niles.

Simon leaned back, his fingertips together. "You must realize that celestial mechanics is a highly developed field. Astrophysical workers can observe and predict the movement of any body quite accurately, so that even in the former days of earth, astronomers should have been able to calculate the exact time at which Halley's Comet would reach perihelion—to the moment, even." He stopped and watched old Ben carefully adjusting a quartz mask over his face.

"You mean before the City of Glass?" said Avis quietly.

"Yes, yes, of course, my dear. You must realize that legions of mathematicians in those primordial days compiled masses of data and figures, but never were they able to predict it more closely than within three days—an unforgivable discrepancy." He leaned back in the big chair until his feet left the floor. "And there was little possibility of error, for their methods of observation were much better than my limited facilities here."

"Oh, Dad, I wish we could get more things for you," said Avis.

"Never mind, never mind," Simon said testily. "Remember this. All observers and calculators in the realm of history"—he

leaned forward until his toes touched the floor again—"have concluded there must be an influence on the comet from some cause unknown."

"What you are getting at is that the comet has been influenced by this unknown body for the last million years?" said Fred.

"Yes, yes."

"But," said Fred, "if I recall, the book said the comet's orbit is thirty-five astronomical units. Pluto's orbit is greater than that."

"Yes, a little," said Simon. He leaned to one side and pressed a button.

A SMALL model of the solar system sprang into life before them, with the sun a small blazing ball, Mercury a tiny black dot, Venus a green ball, and Mars a red planet. They all were there, even to Pluto, and all revolved and moved in orderly fashion around the tiny sun, with nothing but magnetism to hold them in place and control their movements. "Notice that all the planets are within seven degrees of the same plane," said Simon. "Whereas the aphelion point of Halley's comet"—he indicated a flaming ball beneath—"is considerably below that plane." He looked up as a hum rose from some mechanism that Ben was working on, and a look of satisfaction came into his eyes. He turned back. "Suppose a body of powerful attractive force were to lie under this plane." His old eyes sparkled.

"It's strange the asteroids aren't affected." Fred pointed to a moving ring like stardust. "Some of their orbits vary thirty degrees from the plane of the ecliptic."

"Quite true. But let's theorize further. We know little of comets. Supposé a comet to be made up of some substance—an unknown element of unknown powers—that is peculiarly susceptible to some other unknown element of opposite powers."

He stopped, embarrassed a little at his own far-flung reasoning.

"Well, it could be true," Simon said defensively. "It's the best I can offer."

"But it's only a guess," objected Fred.

"If we assume the comet itself to fit the theory, my hypothesis would be proved."

Len was writing figures in his notebook. Now he looked up.

"Your photographic plates have shown nothing?" he asked.

"Nothing but a black spot," said Simon, and seemed to wait.

"To cause the present solar disturbances, the unknown body's mass is tremendous, of course." He looked for confirmation.

Simon leaned back until his feet left the floor, and nodded. "Yes?"

"And still you can't see it?"

"Yes."

"The logical explanation is—let's see—the body's mass would be somewhere in the neighborhood of twenty-five million times that of the sun."

"Go on," said Simon, pleased over something.

"This doesn't mean it's that much larger than the sun, or any larger—or even as large. It may be incredibly dense."

"Quite right, my boy."

"Such a mass would be roughly some fifty decillion tons—five times ten to the thirty-fourth power." For some reason Len Niles had trouble getting his breath. "And the mass of the entire universe has been estimated at one quintillion decillion tons—ten to the fifty-first power. Therefore—therefore this body—this dwarf star—or planet—would contain two-thirds of the mass of the entire universe!"

"Very good," said Simon, and at his tense tone both Fred and Avis leaned forward a little.

"Then," Len Niles said doggedly—seeming to doubt his figures but not willing to back down—"the mass of this body would be so great that its critical velocity would be around two hundred thousand miles a second, and"—he drew a deep breath—"light itself would not have sufficient speed to leave the planet's surface!"

The hum from Ben's machine rose to a high, weird note—almost a scream. Simon glanced toward it and satisfaction came into his eyes. His feet came down to touch the floor.

"Quite right." His voice turned grave. "It could emit no light whatever. That is why we cannot see it now."

## CHAPTER VI

### *A Spy*

HIS face tense with interest, Fred had sunk low in his chair, but Avis sat forward, her brown eyes wide, watching first Len Niles, then her father.

"Of course, if we were closer, we might be able to see, because undoubtedly the gravitational effect would be the same as that on a rocketship," said Simon. "If a rocket is fired from earth at less than the speed of escape, it goes up a short distance

—depending on its initial velocity, but it loses speed and eventually falls back."

"But if we were close enough to see it—" said Avis, and stopped.

"Sure," said Fred. "We'd be drawn into the planet at terminal velocity, faster than the speed of light."

Len Niles turned to Simon. "Is there anything we can do from the Earth itself?"

"No-o, not from Earth."

"But maybe the Glassmen themselves are preparing to offset the influence of this—this—" said Avis.

"Call it Planet G," suggested her father. "It isn't a star, because it is not luminous. According to my theory, it isn't a true planet, either, but its volume is small and it is opaque."

"Planet G, then," said Avis.

"No, I think the Glassmen are not scientifically capable. If they were, they would have done something about it already."

"But I'm sure that you have some ideas," said Len.

The high scream of Ben's machine turned to a deep, fast, powerful throbbing. Simon leaned back in the big chair and placed his fingertips together.

"Only," he said as if he were very tired, "the obvious one of escape."

"Escape! But how?"

"Yes, I know. You wouldn't want to leave the Glassmen helpless, even after what they've done to us, and I don't blame you. But it's the only answer I know. Ever since I got in here from the Outside, I've been working on space-flight, as you know. We had Dr. Beckwith's original formula for the use of U-Two-thirty-five in a true atomic-power engine. A little at a time I smuggled parts of his wrecked ship underground. When we first discovered the danger of Planet G, I thought you could persuade the Glassmen to let us build ships to take all inhabitants of the City to some other part of the universe."

"But that isn't feasible," said Len.

"I'm afraid not. The first ship is ready for flight, but it is small, and there is not enough time to build even one more."

"How much time do we have?" asked Avis anxiously.

"Provided the present rate of acceleration does not increase, I would say six weeks at the most," Simon said carefully. "Within that length of time the earth will enter a period of tremendous disturbances—earthquakes, storms, lightning, submarine volcanoes, tidal waves. The City is certain to be destroyed."

Len Niles took out the package of hydropones, looked at them, put them back in his pocket.

"If the ship is used for interplanetary travel, there are a great many other problems to be met," he said slowly.

"Yes," said Simon. "A force to combat gravity was obviously necessary and I worked on that while Ben went ahead with the development of an atomic motor. To some extent I was successful. Save for the scarcity of the element I am using to power the method—"

"Sh!" Len Niles' sibilant warning was sharp, low. "Watch that viewing-sphere!" he whispered.

The door through which they had come was opening slowly. They had a vague glimpse of a Glassman's green face, and Len leaped up. But they were blinded by a sudden intense light. Len stumbled toward the door, trying to feel his way, but a Glassman's voice stopped him.

"I've found it!" he said crackingly. "An entire underground workshop! It's taken me a long time, but I've got you now. It's a plot against the Regulating Body! You'll all be sent Outside for this!"

"If I could only see!" cried Len.

An explosion sounded in his ear. The center of the brilliant light dropped to the floor and suddenly went out entirely. The room seemed black as the night Outside.

Len did not move, for he was still blind.

"What happened?" he asked, bewildered.

Simon's voice came to him, old and weary, but steady.

"I killed him," he said. "With a glass pistol like those Hart Niles first made to protect the City from the Cros. I've kept it for something like this."

SLOWLY Len Niles breathed a great sigh of relief. "How could you see?" he asked. "I could hardly tell from which direction the light came?"

"I have experimented many years with powerful radiations," said Simon. "And so—I am almost blind."

"Blind!"

"I can discern shapes, outlines. I could distinguish him well enough to—shoot."

They were silent for a moment.

"Who is it?" asked Avis. "Who—got killed?"

"We'll find out. I am beginning to see now," said Len Niles.

But Fred's sight returned first. He looked at the face of the fallen Glassman and then came back to them.

"We're in for it now," he said glumly. "He's deader than a prehistoric steer."

"Who is it?" insisted Avis.

"Who do you suppose?" Fred muttered. "Jebek, of course. The brother of Kardox."

Len Niles could not repress an exclamation of dismay. Avis clutched his arm.

"What can we do, Len?" she asked.

He could see her clearly now. Her brown eyes were round with fear. He controlled his own agitation quickly.

"We couldn't have let him live," he said. "No matter what the consequences, if he had gone out of here alive, it would have been the end of the laboratory and all the Nilesmen," Fred added. "But we're sunk anyway. Now he will be missing, and everybody around the Big Arena saw him having an argument with Len. They will be after Len first. When Mirl hears about Jebek, he will tell what he knows, and there will be an investigation that will lead eventually to this laboratory. Then we'll all go Outside. We won't any of us have a chance."

Len Niles put a hand on Jebek's chest.

"He's dead, all right. Those primordial pistols are vicious little things."

Simon was holding his hands over his eyes.

"I never killed a man before," he said brokenly, "but I made up my mind long ago not to hesitate if it became necessary."

"Let's dispose of the body." Len was businesslike. "We could burn it."

"Why not take it Outside?" asked Avis. "If he is found by a Wheel, they couldn't tell exactly what happened to him."

"Right," said Len Niles. "If they find him Outside, it would at least delay things. And even if they don't find him, we'll have maybe a week. Mirl might stay quiet that long. He's really not the kind to tell on us."

"You hope," said Fred.

Len Niles looked at him steadily. "You are not the most optimistic person in the City," he said.

They arranged a sling of glass rope. Len and Fred tied the body so they could carry it between them. "This isn't a pleasant job," said Len.

Fred scowled. "Don't forget that I don't do this every day, either," he muttered.

They got the body into the huge, sloping air-inlet pipe. Len walked up the ladder-like glass steps on the left side, with Fred on the right. Between them were a pair of steel rails which followed the pipe along the floor. Avis insisted on going with them.

Jebek's body was heavy. When they finally pushed aside the screen at the end of the inlet-tube, all of them were breathing heavily. Here the cold of the vast desert chilled them rapidly. Away from the sun-lights of the City, which provided light and warmth as well as the essential catalyst for conversion of silicon into energy, their brief glastic garments did not give much protection.

Avis shivered.

"Why is this planet so hostile?" she said. "If we could live Outside, we could leave all this trouble with the Glassmen?"

Len Niles pointed to the sky.

"Up yonder somewhere," he said, "is Planet G, a million times more dangerous than the Glassmen." He looked behind, over the great curving black dome of the City. "An electrical storm is coming. We'll have to move fast."

"I'll go with you," said Fred.

"No. It's better for you to wait here. I may need help. The Wheels will be on the prowl, sensing this storm and hoping for moisture. I don't think it will take long."

HE put Jebek's body over his shoulders and carried it through the sand two hundred yards to one side of the tube and away from the City's dome. He laid it in the sand and straightened up, looked around. Then he bent down and removed the ropes. Still he didn't hear the sibilant motion of a heavy animal rolling on sand. He started out from the body, made a wide circle, and came back toward it. The wind was rising. Thunderbolts rolled and crackled beyond the dome. There might even be a few drops of water. What was it his grandfather had said they used to call that on Earth?

Then a faint cry came to his ears.

"Len, run!" It was the voice of Avis. She appeared to be almost frantic with fear.

He whirled around in the sand. There, rolling up behind him, a hundred feet away, was the huge bulk of a Wheel, moving swiftly, sensing the moisture in his body. He spent a crucial second locating the corpse of Jebek, and then he ran. Ran straight toward the body, hearing now the swift flattening of the sand as the Wheel picked up speed.

He stumbled over the body, landed on his shoulders, rolled to his feet, and swerved toward the tube. He reached Avis and Fred. "It almost got you, Len," Avis whispered unsteadily.

He looked back. The Wheel was coming to a ponderous stop. It reversed its motion and went back. A lightning-flash showed its great bulk settling, to absorb the last drop of moisture from Jebek's body.

Len Niles drew a deep breath.

"Let's get back," he said. "The wind will cover our tracks."

Presently they came out under one of the fixers.

"Did you run into Jebek?" the superintendent asked them.

"Yes," said Len.

"He's been down here a great deal lately. I couldn't stop him."

Len Niles looked about at their anxious faces.

"Jebek won't bother you any more," he said, and went across the floor.

The elevator man looked at them curiously.

"A courier from Administration was just down here looking for Jebek," he said. "Have you seen him?"

"He isn't in the fixer-room," Len Niles answered.

## CHAPTER VII

### *Glassman Missing*

THE next day Len Niles left home early. He stopped at the Yellow Dome and went into the office of Aldo, a tall, slender man, garbed in the yellow tunic of Historical Research.

"I'm glad to see you, Len," Aldo said, with a faint rustling of his facial muscles.

"I suppose you know the rumor that is going around," Len Niles said casually.

Aldo's green lips tightened a little. "Yes, I'm afraid I do."

"We Nilesmen don't get much direct information," said Len. "I wonder if you can tell me what it is all about."

Aldo was thoughtful. "I don't know why Kar—the Regulating Body—withholds such information, but as yet there is no absolute ban on giving it out."

"What are the symptoms?"

Aldo closed a thin-leafed glass book and returned it to its shelf.

"The earth's orbit," he said, "is becoming highly erratic. Just now we are about a month from aphelion, when our distance from the sun should be some ninety-four million, four hundred thousand miles—but instead, Earth already is ninety-six million miles from the Sun." He faced Len squarely. "We can't tell what will happen. Will Earth reach an aphelion point and from there resume some sort of orbit around the sun, or"—he clenched his hands—"will it shoot off at an ever-straightening tangent and leave forever the influence of the sun?" His green face was white.

Len Niles drew his shoulders together. It seemed cold in the room. The danger, stated in terms of miles and days, was a shock. Apparently Simon had wanted to spare them.

"There has been no announcement from the Astronomical Dome?" Len said finally.

"No, of course not. They are concerned with facts only—not the results. But of course Kardox has known. He has known even more, too."

"More!" Len sat straighter. He didn't need to pretend astonishment now.

"Pluto," the Glassman said, "is almost in line with the Sun and Earth—and has been for eight weeks. Do you realize what this means?"

Len Niles shook his head as if to clear his vision.

"Yes," he said slowly. "That means that Pluto is picking up terrific speed." He reached for the hydropones. "One to a hun—" He remembered what happened in Simon's office. "One to ten that it lights," he said.

Aldo smiled, a little wan. "I'll take it."

Len pressed the button. Now he knew why Simon hadn't told him these things. Simon's guess as to the remaining time was close, but he hadn't told them the full extent of the danger because he didn't know! His facilities for observation were too limited. Nevertheless he had arrived at the same general conclusion as the Astronomical Dome. The Glassmen's observation indicated four weeks. Simon had guessed the danger-point at six weeks. The hydropone popped up and smoke curled from it. Len smiled tightly and gave Aldo a sando.

"Why hasn't the Regulating Body asked us to help?"

Aldo shrugged. "They say you'll stop us forever from going back to carbon, if you can. And of course, Len, we'd like to be white again. These green skins aren't natural." He twisted his head and the skin of his neck made a faint crackling. "You see?"

"Yes. But has anyone told you why I'm against the idea?"

"I know. You say it isn't safe. And you know more about it than anybody in the City."

Len Niles stood up. "Thanks a lot," he said. "I've got some thinking to do."

He went straight to the Inorganic Laboratory. He had only three minutes to change clothes, and although he didn't feel like hurrying, it wouldn't do to change tac-

tics at this stage of things.

He slipped into the white glastic uniform and started quickly for the door. The chronometer showed twenty-five seconds, and he hurried, though the overseer frowned.

But just outside the door he stopped. Three Nilesmen were coming in late, talking excitedly.

"Did you hear what happened?" one asked him.

"No," said Len, watching the overseer.

"A Glassman is missing. Disappeared from the Administration Dome last night."

"Is that so," said Len. "Where—how—is Kardox?"

"Kardox has sent out investigators. They'll probably talk to you."

"To me?"

"Yes. Wasn't Mirl a friend of yours?"

"Mirl!" asked Len.

"Sure. Mirl's missing. Didn't get home last night."

BY AN effort Len Niles concealed his emotion. He had almost given himself away. But now Mirl was missing. Glowing rings of Saturn! What next?

Len couldn't have worked intelligently at anything after that. He thought of taking the day off, but that would have been suspicious, so he went through the same motions as the day before.

Fred came by and stopped for a minute.

"What do you suppose happened to Mirl?" asked Len.

Fred's face was etched in sour lines.

"Something like this would have to happen now."

Len Niles ventured to speculate. "Mirl was pretty drunk last night. He might have forgotton to go home."

"You're as gloomy as the under-side of Uranus," said Fred.

"If he doesn't appear, they'll tighten the restrictions so we can't do anything."

"Have you forgotten what will happen when Jebek turns up missing?"

"Well, no, but after all, they may find Jebek's body Outside."

"His body?" Fred laughed shortly. "You mean a pattern of crushed bone in the sand."

"They'd find his identification disk. Not even a Wheel would take that. Say"—Len's eyes lighted up—"do you suppose it's really Jebek who is missing?"

Fred was sour. "He's missing, all right."

"I mean—"

Fred shook his dark head warningly. "We'd better get to work. The supervisor is watching us."

But certainly there was little done on the eighth shift that day. Nilesmen gathered by twos and threes and talked in low voices. They were silent when Glassmen went by.

Soon the hour and a half was over. For once Len did not clean up his bench. The soft whistling of the audio came just before quitting-time. All the Nilesmen in the big laboratory hurried to the end of the room.

"For the first time in two hundred years," said a crackling voice, "a murder has been committed in the City of Glass. The body of Mirl, Number Seven-eight-oh-nine, was found today in a magnetic car. He had been dead for some time, and marks on his neck indicated that he had been suffocated by pressure of human fingers. The Regulator promises that the man who took his life will be found and punished immediately."

Len groaned. He and Fred went to the locker-room.

"Murdered!" said Len slowly.

"The only good thing about it," Fred pointed out, "is that he had been dead for some time. Maybe he didn't get a chance to tell. Do you suppose—I wonder who did it?"

Then they met Walter, coming in for the ninth shift.

"Did you hear?" said Len. "Mirl is dead."

He watched Walter's face. The young features, etched in too-deep lines, did not show surprise. Instead, into his eyes for the first time came fear.

"Do you think they will find out who killed him?" he asked.

For a moment the two men stood there, looking at Walter in consternation. Then without answering the boy's question, they turned away and hurried off to change back into their street clothes.

After dressing, Len and Fred left the laboratory together. Neither one spoke of the guilt in Walter's eyes.

Len turned off at his door.

"See you tomorrow."

Some hours later, when the sun no longer burned down on the battery-bricks that made up the huge dome over the City, Len Niles went out again. Two green-tunicked Glassmen were standing at the entrance of the Black Dome. Len had intended to go in for a few minutes, but at sight of the guards he went on by. A guard was stationed in the fixer-room, too, but Len had no trouble getting away from him.

Soon he was again going through that last door of the tunnel. Behind him appeared gray-haired old Simon.

Anxiously Len told him the complete,

detailed story of what was happening above.

"We'll have to move fast, if we are to have any chance at all of saving the Earth," he urged.

"I am just about ready," Simon said slowly. "I spent most of the night checking my previous observations."

"I talked to Aldo," said Len Niles. "He says the Astronomical Dome reports aphelion point is already exceeded."

SIMON wagged his head slowly. "I was afraid of that. It is difficult to make observations from our place in the desert. Yesterday morning the wind had blown away most of the sand, so we all went up last night to cover it again. Fortunately the Glassmen didn't go outside yesterday."

"It's strange they haven't discovered it in the last twenty years."

"No, not so. The last two generations have almost ceased exploring and the rocket-sleds aren't sandworthy any more, nor have they made new energy-batteries, so they can't go far from the City, and then only in emergency."

Len nodded. "Is there any change in the—" He left it unfinished.

Simon led him into the office and sat in the big chair.

"The drift continues to accelerate. The speed of the system as a whole now has reached something like eighty miles a second, from a normal rate of twelve miles a second."

Len's lips tightened. He held out the hydropones. Simon reached, then drew back.

"A little bet?" he asked, and smiled.

Len made a face. "Not today," he said. "I've got to think about that."

Simon leaned back until his feet left the nitrate floor. "The ship is about ready," he said, "but for fuel. We shall have to have about twenty pounds of uranium-two-thirty-five." He paused.

Len Niles was thoughtful for a moment. "And the only place to get it is in the vault at the Administration Dome," he said finally.

"I'm afraid so."

Len made no comment.

"Do you think it's—it's—too dangerous?" Simon faltered.

"I'll get the uranium," said Len. "I don't know how, but I'll do it." He got up to leave. "What day will the take-off be?"

Simon's wrinkled face tightened. "When you come back with the uranium, I'll have the plans worked out."

Len looked at him. He knew then that Simon had everything ready, that he needed only the fuel, so he dropped the subject. "Did you see the remains of Jebek?"

Simon regarded the hydropone. "Yes," he said.

"I suppose you heard about Mirl over the audio."

Simon shook his head.

Len told him about Mirl but said nothing of their suspicion of Walter. He shook hands with Simon, a grim acknowledgment of the danger he would run in trying to steal half of the City's extremely precious store of uranium.

He hurried up the tunnel. He was careful to come out from under the same machine. He didn't want that sharp-eyed guard to see him.

"Well!" said a crackling voice. "So there you are! I looked for you but I couldn't see you." There was accusation in the guard's words.

"Trouble with the air-pump," said Len, breathing hard. "I had to crawl inside."

The guard didn't answer. Len left, and back on the surface, went straight to the apartment. His mother was watching the televisual globe. She pointed to it without a word.

Len Niles sat down hard. He watched. And listened.

Walter was in the center of the globe, young, impatient Walter, in his orange tunic and shaking his dark hair vigorously as he addressed a meeting of mixed Nilesmen and Glassmen and Pales in the auditorium of the Blue Dome. From the sweat on Walter's face, he must have been talking for some time.

"—So, fellow-residents of the City of Glass, as I have pointed out, it is a traditional and legal right that Nilesmen have a representative on the Regulating Body. A right earned by Hart Niles when he saved the City from extinction. I also have pointed out that Nilesmen have been denied that right since my father Simon was sent Outside. It isn't fair or just that we three hundred have no one to speak for us. We demand that the Regulating Body at once order an election to be held for the purpose of placing a Nilesman on that body!"

He threw his head back dramatically. Cheers came from the group. Then came the voice of the intersperser.

"You have just listened to an address by Walter Niles, No. N-Four-one-two, who—"

Len Niles turned it off.

"Oh, gosh!" he groaned. "We never have meteorites but that we don't have comets!"

## CHAPTER VIII

*Election*

WORRIED by recent events, Len walked through the City that evening. Doors opened and closed noiselessly. Shoe-heels and soles, with their special composition, made no sound on the walks. There were never loud voices, and the throbbing and whirring of the big fixers below was lost before it reached the surface. The only sound in all the City was the soft sucking of the magnetic cars as they floated swiftly above the streets.

Len Niles tried to imagine the world that Hart Niles had told about, of clanging machines, pounding metal, vehicles traveling independently in any direction, busy people, hurrying, hurrying, always hurrying, regardless of the noise they made.

Now it came to him that tonight there was a difference in the City itself. It was hardly a difference of sound, but rather of intentness. Glassmen, Pales, and Nilesmen all seemed to be going somewhere with a purpose.

Len passed the Golden Dome of Administration and kept walking. He wouldn't have a chance to get away with the uranium now. He turned this problem over in his mind before he went home.

He didn't sleep well that night. He dreamed that a Wheel was settling its twenty tons over him. He woke up fighting furiously, and stayed awake for a long time.

His mother called him about noon.

"Over the telaudio this morning an election was proclaimed to choose a Nilesman on the Regulating Body," she said anxiously.

Len yawned and tried to rub his eyes open.

"I think that means more trouble, Len," his mother said quietly. "Whoever is elected will be maneuvered into taking responsibility for oppression of the Nilesmen."

Len sat on the edge of the bed.

"I hadn't thought of that," he said. "But what more can they do? There isn't time, anyway."

"Len, you are young and I am not," said the woman. "I have heard Hart Niles tell of unbelievable oppressions—refusal to allow food to hundreds of persons, separation of families, torture and killing. We have nothing like that here. But we might have."

Len got up and stretched his long body. "I guess you're right. It could be worse. It might be that tomorrow we shall be fighting to maintain conditions as they are now." His strong hands fell on her shoulders. "Anyway, we're in it too deep at this time to quit. How is it, when there is such a tremendous common danger, we can bicker over things that aren't important?"

"Human nature doesn't seem to have changed much, Len." She hugged him briefly. "I'll get the breakfast table ready." She went out. It was amazing, Len thought. The dread in her eyes, the catch in her voice, and yet—she walked as steadily as he did.

In the Inorganic Laboratory, a group of Nilesmen, already dressed in white aprons, was gathered around the telaudio when Len got there.

"The election will be at sixteen hundred tonight," said one of them to Len, and turned to the others. "Three suns for Len Niles, our new Regulator!"

Len smiled. "Let's wait till after election," he said.

Len left hurriedly. Fred was coming out of the locker-room.

"New regulations posted," he said. "They're bearing down already."

Len started to answer, but a green-skinned Glassman, a very old man, came by slowly, his stiff joints creaking and rustling at every step.

"He's here!" Len whispered. "What for?"

They listened to him walk slowly away. They turned and watched. His head was moving so that his vision took in the entire room. Those huge, gray-green pupils, developed by generations of careful selection and treatment, could see infra-red rays invisible to normal eyes. Bigyz' presence was ominous in itself.

They watched him for a moment, and then Len made a suggestion.

"Let's read the new rules."

The lines of black script, with a light somewhere behind them, stood out on a sheet of frosted glass on the bulletin board:

EFFECTIVE IMMEDIATELY

1. Laboratory hours are reduced to one hour per day, four days per week.
2. The rest period is reduced to ten minutes.
3. Banishment to the Outside will be ordered for any one found in possession of books or any reading material. The same punishment will be ordered for any one who thinks about a new problem.

KARDOX, No. 1.

THE Nilesmen, a dozen of them by now, muttered all around Len.

"One hour a day!" Len shook his head

wearily. "How can they know what we think?" "How do we know they can tell at all?" "I don't believe they can. It's a bluff."

Two Glassmen walked by in gray tunics. The Nilesmen were silent until they had passed.

"They're from the Mental Research Dome," somebody whispered. "Do you think they're helping Bigyz?"

Nobody thought. What good would it do? Len voiced their sentiments.

"If they can read minds, we are all doomed."

The one hour of work was a long one. They were, for once, glad to leave, with the two inspectors from Mental Research roaming the laboratory, and the ancient Bigyz creaking slowly up and down the room saying nothing, just watching, and listening.

"I wonder why they haven't announced Jebek's disappearance," Fred came over once and whispered.

Len Niles looked around before he answered.

"I think they want to find out first what happened to him," he said, carefully adjusting the burner under a Crookes tube. He bent low to watch a purple tint rise from the bottom of the tube. "He wasn't very dependable, you know, and if they announce he is missing now, after Mirl's death, and then later he shows up full of Sizzling Comets, it would ridicule Kardox." He turned out the burner.

They voted at the Yellow Dome. Aldo was there at the televoter.

A stream of Glassmen and Pales and a few Nilesmen were filing by the televoter. Each wrote a name on the screen. Then it flashed off and was recorded and sent to the Golden Dome by telaudio.

Avis came in, her warm eyes shining at Len, her pink shoe-heels glowing as she walked, and Len couldn't help seeing her write "Len Niles" in a firm hand. She came over and sat down with them.

As the minute-hand reached seventeen hundred, the lights on the televoter went out. Fifty seconds later the telaudio glowed.

"Results of tonight's election," said the intersperser. "Two thousand, six hundred and ninety-two votes for Len Niles, one vote for" —he paused—"one vote for Simon. . . ." Then he went on. "As of nineteen hundred tonight, Len Niles will be officially a member of the Regulating Body."

Avis gasped. "You!" She turned to Len Niles. "You voted for father!"

"A protest," Len said.

Avis' eyes were shining. "You were elected unanimously! The Nilesmen have faith in you, Len. And so do the Glassmen. All who voted, voted for you!"

But Len Niles was glum. "What can I do for the Nilesmen now?"

"You can try," she said confidently, "and I know you can help."

The three started for home. Len felt heavy. He, perhaps better than most, realized how difficult it would be to improve conditions for the Nilesmen.

With time, many things might be done for improvement. Eventually Len could get the Niles scientists to work on sun-power, and once that could be utilized for fuel, the changeover to a carbon economy would be simple. By that time, too, the problems of iron could be solved, if they were allowed freedom in working them out.

Len suddenly shook his head and looked to see where they were. He'd been dreaming. Only one thing now was important—to save the Earth.

"There's a meeting in the Blue Dome," Avis said, touching his arm. "Let's listen."

Len frowned. "Why now?" he wondered. "The election is all over."

They went inside. In the glass cubicle over the center of the auditorium was Walter, making a fiery speech. The auditorium was crowded, and Walter turned gradually as on a pivot, addressing them all, one section at a time.

Avis gasped and Fred scowled and then sighed. But Len Niles grinned.

"You'll have to admit the kid is good," he said.

"—and now we want the rights inherent in us as a race of human beings!" Walter shouted. "We want longer hours, less credit, freedom to work and to read and to think as we wish. The freedom that you as Glassmen all have and enjoy. This is your fight, too. They are restricting us now. They'll restrict you next. We've got a member on the Regulating Body now, a member who will fight! When he fights, remember that he is fighting, not for Nilesmen alone, but for Glassmen and for Pales—for all the human race."

A ROAR of approval. Glassmen and Nilesmen alike stood up and waved and cheered. "Len Niles is our man!" they cried.

"Let's sneak out," said Len.

"Len!" Avis turned to him. "Did you see how they're behind you!"

"So what?" growled Fred.

Len shook his head. "For once, Fred is right. This demonstration is wasted energy."

They approached the Golden Dome. Len stared at its wide entrance.

"What's the time, Fred?" he asked.

Fred looked. "Ninety-five minutes past eighteen hundred," he said. "In another five minutes you will be a Regulator."

"In five minutes, if I can put it over, we shall have accomplished the only thing possible to save the human race from destruction," Len answered. "Listen carefully. You two walk slowly around the block and then enter the Dome and go to the elevator. You should meet me somewhere along the hall. I shall have twenty pounds of uranium with me. Avis, I'm going to give it to you."

"Twenty pounds! I can't hide that much."

"Twenty pounds of uranium is no more than the size of your clenched hand—and that is small," said Len. "You can put it in your hand-bag. We'll all go down together. If they should stop me, the future existence of humanity is in your bag"—abruptly he spoke in a lighter tone—"along with the things that make you pretty and make you smell so good." He looked at her admiringly for an instant and his voice became business-like again. "Get that uranium to Simon, regardless of the cost."

A golden-skinned Glasswoman and a Glassman came along the sidewalk. The Glasswoman spoke to her companion, a little enviously.

"That's the man who lost eight hundred sandoes the other night."

Len Niles sighed as they passed. "Such is fame," he said.

Fred and Avis started off, Avis' pink heels flashing rapidly as she walked. Len went straight to the big golden doors. Inside, he turned to the left and descended some narrow stairs. A guard stopped him but nodded when he saw it was Len Niles. A moment later Len was in the indestructible glass vault. Two green-tunicked guards confronted him.

"Len Niles," he called out sharply. "For twenty pounds of uranium for the fixers."

The older guard stared at him a moment.

"You have an order signed by a Regulator?" he asked.

But the other guard spoke. "He doesn't need an order. It is nineteen hundred. He is a Regulator himself."

A young fellow, Len thought, eager to make an impression. The older man was cautious, and if he were alone, regardless of the rules, he would have confirmed the order. But he wouldn't run the risk of being shown up before this zealous young man. If he should make an error and offend a Regulator, he might be reduced in rank and have his pay raised.

A soft whistle came from the telaudio.

"First meeting of the new Regulating Body will be held at the hour of twenty hundred tonight," said the announcer. "Important business will come up. All Regulators are requested to be present."

"All right," the older guard said finally. "Sign the register." He wrote after Len Niles' name, "Twenty libas U-two-three-five."

He was back in a moment with a small lead-glass container filled with a silvery-white metal. He handed it carefully to Len.

Len Niles took the Uranium and marched out. He felt as if he were walking on a red-hot floor. Now was the dangerous time. As soon as the older guard could get away, he would call Kardox to verify the withdrawal. Len went up to the main corridor and turned to the elevator. Fred and Avis were walking ahead of him, Avis' pink heels moving slowly. She glanced back but said nothing. Her brown eyes were bright in her white face.

Len Niles caught up with them and dropped the container into her bag as she held it open. Fred's face was taut. Avis put the bag firmly under her arm and they walked onto the waiting-plate.

The elevator came up. They got in. The elevator dropped. They got off at the thirty-fifth level. A guard confronted them, and Len grew tense. But the guard stood at attention and they passed. The three went in among the machines. Len touched Avis' arm and she darted down under the big intake pump.

"Careful," Len whispered. "Get back as soon as you can."

He and Fred went to the superintendent's cubicle. Len went back down to examine the compressor-shaft. It seemed hours before he saw Avis' pink heels coming across the floor. She came up to him. He looked at her. She nodded. They went back to the elevator.

THEY got outside without challenge. Len took a deep breath—the first, it seemed, for hours. He looked at Avis and her face was white.

"It won't be long now," Fred was muttering.

"Father wants us three back there by this time tomorrow," said Avis.

"We'd better go separately, then," said Len. "You first, Avis, Fred next, and I'll

come last. If there is any hint of trouble, both of you get away as soon as you can."

"How about you, Len?" asked Avis softly.

Len was grim.

"I have plans," he said. "I'll be there."

He went back in by another door, took the Regulators' elevator to the council-room in the very Dome itself, just under the black vaulted roof of the City. A guard stopped him outside and took him to the tunic-room, where he was fitted with a new golden tunic.

"You should get your new shoes, sir," the tunicker said respectfully. "They were available three days ago."

Len glanced involuntarily at the new toenail. He'd better trim that tonight—no matter how proud he was of it.

"I'll get them tomorrow," he said.

He was ushered into the Golden Room. His guards stopped, and Len stopped. Before him was a big room, in its center a small glass table, scarred and scratched a little on top. He'd never seen it before. That table was three hundred thousand years old, the City's most priceless heritage—the first article made by Kasner, Number 1 of all Glassmen, who had found the great nitrate bed, the only one left on Earth, and had located the City over it. It had been he who had laid the rules for the preservation of the race. Kasner had been the man who originated and guided the Glassmen's first steps toward the change-over to a silicon economy. It was he who had looked ahead to ultimate exhaustion of nitrate, and who had redesigned the human race to alter its bodily functions to take advantage of the one all-plentiful element—silicon.

Len Niles' eyes lifted. Around that table had sat Kasner, and Magrum, and Zudat, and Perso, and Hart Niles, and Simon. At that table had been made the momentous decision to let Hart Niles have nitrate to make gunpowder for defense against the Cros. At that table Hart Niles had proposed his plan to trade nitrate to the Cros for iron ore, weight for weight. The history of the human race had passed in review across that scratched glass top—and now he, Len Niles, was to sit at it and participate in decisions that once again would determine whether or not the race would continue to exist or be wiped forever from the channels of time. Len Niles' chest swelled with sudden emotion.

Four men stood up around the council-table. Kardox, who presided, was tall, green-skinned, angular-faced, and middle-aged, the older brother of Jebek. The strain of harassing weeks showed in his lean features. Murco was direct descendent of Magrum. He was a young man, slated to be Number 1 whenever Kardox decided to retire. Ancient Darum, said to be a hundred and fifty years old, was small, shriveled, stooped. His green skin appeared to be brittle with age, but he had a reputation of being alert of mind and quick of decision. Aldo, now wearing a golden tunic, stood watching Len Niles with kindness and hope.

These four leaders, in golden tunics, were waiting for Len to advance. Kardox gripped his hand.

"You will be seated in the Number Five position, across from Aldo," Kardox said.

Len Niles took the indicated place behind the chair. Kardox sat down. They followed his example.

"You are well acquainted, Len Niles, with the prerogatives and procedure of the Regulating Body. We are proud to have you here."

Len Niles knew that he was sincere. This man, too, had the future of the race in his heart. His responsibility was heavy. What he did, right or wrong, he did sincerely.

"Our first item," said Kardox, turning the leaves of a notebook—and his voice came to Len Niles as from interstellar distance, and his words blazed like a comet through Len's brain—"our first item is the trial of Walter Niles for the murder of Mirl, a Glassman."

## CHAPTER IX

### *Death Sentence*

DAZED with surprise, Len Niles sat in the Number 5 chair while Kardox read briefly from his notes. "Walter was observed arguing with Mirl . . ." And so on, the bare facts of the case.

Dark-eyed Walter was brought in. He was scared now—scared but defiant. He refused to answer yes or no to the charge.

Murco began to speak.

"Is it not true that you have been arousing the people in the last several days?" he asked Walter.

Instantly Len Niles was on his feet. "That has no bearing on this charge," he said. "If arousing the people is against the Code, he can be tried for it. At present he is charged with murder." Len spoke directly to Kardox. "One charge does not bear on the other. So far there is no evidence whatever that Walter killed Mirl."

Kardox nodded. "The point is a good one. You will—"

A soft whistle interrupted him. Kardox looked up at the indicator lights. "Bring him in," he said.

An old man appeared, his skin gritting with every step. He advanced and waited, his gray-green eyes slowly sweeping the Regulators.

"Bigyz," said Kardox, "let us have your report."

The old man spoke creakingly. "I dusted a radioactive reagent on Mirl's neck and examined the fingerprints," he said, and paused to breathe noisily. "The prints on Mirl's neck are of six fingers and these coincide with six fingers of Walter Niles."

"Is this conclusive evidence?" Len asked.

Bigyz fixed his gray-green pupils impersonally on Len Niles.

"I may say that in the City of Glass there is no other person with six prints of the same classifications. As you know, Regulator Len, the fingers of Glassmen have a distinctly different type of pattern that runs in diagonal lines instead of loops."

Len looked at Walter. The boy's face was white under his black hair. Len saw the guilt and the fear in his eyes.

Kardox spoke. "Thank you, Bigyz. Are there any questions? . . . Walter?"

The boy shook his head.

"What is the decision?" asked Kardox, looking up and down, at the faces of the Regulators.

Darum raised his green hand and pointed to the Entrance of the City. So did Murco. So did Aldo, slowly, reluctantly. Kardox looked at Len whose teeth were clenched tightly. But finally he looked at Walter again, and then slowly raised his hand and pointed Outside.

Kardox arose. "You will be taken Outside at twenty-three hundred tonight," he said to Walter.

Walter trembled. He started to speak. He looked angrily at Len Niles, then suddenly wheeled and marched away. A messenger met the guards and departing prisoner at the door and stepped around them, came straight to Kardox and handed him a written message.

Kardox read it and looked up, his face somewhat grim. "Regulator Len Niles, you signed a receipt for twenty pounds of uranium—almost half of the City's store—at just past nineteen hundred tonight. Is that true?"

It stunned Len. But somehow he controlled his breath.

"Yes," he said clearly.

"You stated this was to be used in the fixers."

"Yes." Len's voice was low.

"But our report shows that an inspector cannot locate this uranium in the fixer-room. Do you care to tell us where it is?"

Len's voice was low. "No."

"I might say that return of the uranium would be an alleviating circumstance."

"I am sorry, but it cannot be returned," said Len tightly.

Kardox waited for some time before he answered. "Then I am compelled to put Regulator Len Niles on trial for the taking of twenty pounds of uranium. Will you defend yourself, Regulator Len?"

Len shook his head. Aldo looked at him, puzzled.

Kardox seemed reluctant to go on. "Regulator Len admits taking twenty pounds of uranium. He will not return it, and he refuses to offer an explanation. I am forced to ask for a decision."

The three Regulators and lean-visaged Kardox stared at Len Niles. No one voted. Finally Kardox spoke again. "Destruction or removal of the City's vital supplies, under the Code, is punishable by banishment. I must ask a decision."

SLOWLY Murco raised his green hand, forefinger extended, and pointed to the Entrance. The ancient Darum slowly followed his example. Kardox looked at Aldo.

"Will you read the Code?" asked Aldo.

"I will," said Kardox. The guard brought a glass-backed book bound in gold. Kardox turned the thin pages. "'Section Eighteen, Paragraph Four,'" he said in his crackling voice. "'Any person who shall be found guilty of destroying or removing from the City's use any vital material, specifically but not exclusively nitrate, potassium phosphate, boric acid, and the sulphates of magnesium, ammonium, manganese, and iron—and any other material that may hereafter be designated as plant-food—and uranium, shall be sent Outside.'" Kardox looked up. "That is the Code, gentlemen."

Aldo looked beseechingly at Len Niles, but silently Len shook his head. Aldo's face tightened. With his eyes full on Len's, he raised his hand and pointed Outside.

"You have seen," said Kardox to Len Niles. "Do you still offer no defense?"

"I do not," Len said reluctantly.

"Then," said Kardox, "you will be sent Outside with Walter at twenty-three hundred."

So ended Len Niles' first meeting around

the historic Regulators' table. Len was chagrined. One hour he'd had on the Regulating Body! He certainly hadn't helped his people much. . . .

Since there was supposed to be no place to which a person might escape, Len was unguarded. It was assumed that a condemned man would present himself at the Golden Dome at the hour set.

He went straight to Fred Niles' apartment. Avis met him at the door with her eyes red.

"It was bad enough, Len, when Walter was banished, but for you also to be condemned is ghastly!"

"Don't cry, my dear," Len said gently. "Everything is in our favor."

Fred didn't comment on that. He just scowled. "You certainly didn't last long," he said.

"There are two of us going Outside together," said Len. "It will be night. We'll get through. Has Walter been here?"

"No, he's at the Black Dome," said Avis. "Len!" She held his arm. Her hand was soft and warm. "You knew this when you voted to send Walter Outside!"

"There was nothing else to do," said Len. "If I had voted no, it would not have changed the result, and I would have antagonized the Regulators toward all Nilesmen."

"But, Len, when I asked how you would get Below, you said you had plans."

"Well, yes," Len admitted. "I knew they'd have me within an hour, and so—how about it? Are you getting ready to start Below?" he asked in brisk tones.

"I'm ready," she said simply. "I want to get down there and tell father so he can be looking for you."

"Good-by, then." He kissed her quickly, shook hands with Fred, and left.

At the Black Dome he found Walter in the Curved Light Room.

"I just won forty thousand sandoes," Walter shouted. His pockets were sagging with uranium thousand-sando disks. "What do I care?"

"It's time to go to the Dome," said Len soberly. Walter walked unsteadily. He wouldn't be of much use.

"You voted to send me Outside," Walter said thickly. "Are you going to help take me?"

"I'm going with you," said Len.

Walter didn't get it.

They were taken in charge by two armed guards and conducted through the streets, watched by a few silent Glassmen. At the Entrance a group of Nilesmen was waiting. They shook hands soberly with Len and Walter.

"Be calm," Len advised them. "There's still hope."

They mounted a rocket-sled driven by two Glassmen with energy-batteries whose terminals were clamped to their upper arms. These two gave receipts to the guards, started the sled's activator, and swung off through the sand away from the City.

"I think we won't need to take them more than twenty diameters from the City," said the driver to the other Glassman. "Our uranium supply is low, anyway."

THEY were swinging to the right, which was good, for on that side was the mouth of the big air tube. The desert was cold and the Moon's light was almost white. Len Niles soon discovered why they were going to the right.

"There was a big drove of Wheels over this way yesterday," said one. He looked back at Len and Walter.

The sled was spitting out a blast of blue-green flame in the night. The glass rails gritted over the sand. Walter sat upright but kept weaving from side to side. Len put out a hand to steady him, and his arm brushed the activator control-box. An idea hit him. If he could move the lever down a very little at a time, it would make the difference between life and death.

He barely touched it. There was no noticeable slackening of speed. But a moment later he touched it again. And then, twelve diameters out, again.

The driver spoke. "We're losing speed, it seems to me."

The other one looked at the gauges. "Yes, we are. That means the uranium is pretty low."

"Do you think we'd better go much farther?" asked the driver.

"It wouldn't be safe at all. We're fourteen diameters out now, anyway, and past the Wheels. This ought to be ample."

"Ample is right!" Len thought grimly. Seven hours' walk from the City, without food or water, with no protection from the cold desert night but the thin clothes they wore.

The sled screeched to a stop. The drivers hesitated, a little embarrassed.

"Regulator Len, disembark!" he commanded.

Len Niles got to his feet. He tugged at Walter, who was asleep.

"Are we here?" Walter mumbled. "Well, at the very least we can show them that

Nilesmen know how to die without fear."

Both Nilesmen stood straight and silent as the sled turned away and started back toward the City. As long as the sled was in sight, the second Glassman guard continued to face them alertly. Finally it disappeared into a hollow and the condemned men were alone. Then only did Len Niles relax. He sighed deeply.

"Come on, Walter," he said. "Let's get going."

"Oh, let's sit here and die peacefully," answered the youth.

"Don't be so dramatic," said Len. "There's a way out of this, if we're lucky. And this is one time I hope we win."

"What are you talking about?"

"All of those who have come into the desert have not died," said Len. "Your father, Simon, still lives—lives and works. We're going to meet him."

"We're what?" Walter's mouth stayed open.

Len produced his hydropones.

"One to ten thousand it lights," he said calmly.

"You—one to ten thousand?" Walter stared at him. "I'll take it," he said automatically.

Len pressed the button. A hydropone popped up and glowed in the night. Len chuckled as he gave Walter a sando. "Luck holds," he said. "Let's move."

They started. The sand was hard-packed and walking came easy. They walked steadily for four hours and, as Walter's sluggishness wore off, they made good time. Len estimated they were more than halfway back. But they must be nearing the rolling-ground of the Wheels.

At the bottom of every depression he scanned the crest of the hill ahead against the night sky. Presently he saw the thing he was watching for—a huge black shape rolling along the sky-line.

Walter ducked low, but Len Niles pulled him up. "That won't help. They don't smell, or see, or hear. They sense only the presence of moisture. But they're not quite as responsive at night as in the daytime. All we can do is wait."

They did. The Wheel lumbered on and down the other side of the hill. They walked up warily. They crossed the thing's path, a twelve-foot-wide, four-inch-deep depression in the hard crust of the desert. They went down the slope.

"Let's follow the valley a while," Len suggested. "It slants toward the City."

But soon the valley opened out onto a flat plain. The sand became softer. They crossed Wheel-tracks. Then a swift sucking of sand came from the left. A big cylinder loomed up, black in the night. Another rolled forward from the rear.

"Run!" yelled Len. "To the right."

ABRUPTLY the two Wheels were converging. Glancing back, Len saw a third. He ran harder. Suddenly he slowed down.

"See that ahead?" he said hoarsely.

"What?"

"Giant fungus. If we go in there, we can get away from the Wheels."

"Let's go."

"Wait." Len glanced back and talked hurriedly. "Swerve under these tall, snake-like brown rods, weaving around." They did so.

"What are they?" asked Walter. "They look big."

"They're forty feet long," answered Len. "They contain powerful charges of static electricity. Their bottom parts are slim stems that act as insulators. If you touch the brown rods, they discharge big sparks."

"That won't hurt us, will it?"

"No, but keep on ducking." Len started under the rods. They grew in patches so thick a man couldn't go between the stems. The huge brown rods weaved and bent. Sometimes their tips almost touched the ground.

"The static will jar you, but it won't hurt you," said Len. "This fungus never grows alone. Somewhere in the field will be a growth of fire-globes. Smell them?"

"Smells like a Sizzling Comet to me," said Walter, sniffing.

"They're globes as big as a house, that grow on slender stems. There isn't much to them, like the fungus, but they contain an inflammable liquid that explodes when a spark hits them."

"Then what?"

Len Niles dodged under a huge weaving rod. "The heat makes the other rods whip around and hit more fire-globes. The whole area will go up in flames."

"What are they waiting on now?"

"They won't be waiting long," said Len. "They are just about mature now. They grow to full size in about a week. Then the explosion sends the spores into the air and they float off to start a new field. Look. There's a bunch over there."

Walter shivered. "We'd better not go this way."

"We have to. We can't turn back. The

Wheels are waiting for us. Just be careful. The field probably isn't over a mile across."

But the fungi grew thicker. It was a winding route, detouring around the beds of spark-rods. The two Nilesmen tried to avoid the areas where fire-globes grew. Presently it was impossible to avoid the fire-globes. They could only continue to walk—and hope. Time was short. Len knew that. The brown, snaky rods were almost long enough to hit the ground. In their writhing, one might touch off a fire-globe at any moment.

"Look out!" he shouted at Walter. The big rod, weaving toward Walter, was light as a feather, but it held a powerful charge. The spark jumped a foot to Walter's shoulder. He shouted hoarsely and staggered. He fell in the sand and Len started to help him up. But the rod whipped away from Walter and then back.

It struck a fire-globe and there was a blinding flash of light. Len was blown off his feet, but he jumped up and shouted at Walter.

There was no answer. The big rods all around him began to writhe in the crackling heat. He ran in close to the base of a big cluster. A second globe exploded and showered burning liquid over the spot where he had been. There was one scream and then no sound but the crackling of flames.

"Walter!"

The flames lifted for an instant and he saw Walter's body in the sand, drenched with blazing liquid. The rolling smoke stung Len's eyes, and the acrid odor burned his nostrils. Walter would never address another public meeting.

Len darted off to the left. The blazing field was expanding fast, the globes exploding and shooting their spores high into the air, drenching area after area with the burning liquid that started more snake-rods weaving.

He ran hard from one clump to another, trying to stay away from the globes, managing to keep clear of the fire. He wound his way through the fungus and finally he saw clear sky ahead. He stumbled out of the last clump as a fire-globe exploded and the whole clump went up in a flaming pyre.

He ran from the heat until he stumbled flat. After a rest, he sat in the sand and watched. Len had no idea where he had come out. But as he looked across the huge burning field, he could see big black shapes on the far hill, waiting The fire would give him more time, because the Wheels would gather around. It would be

[Turn page]


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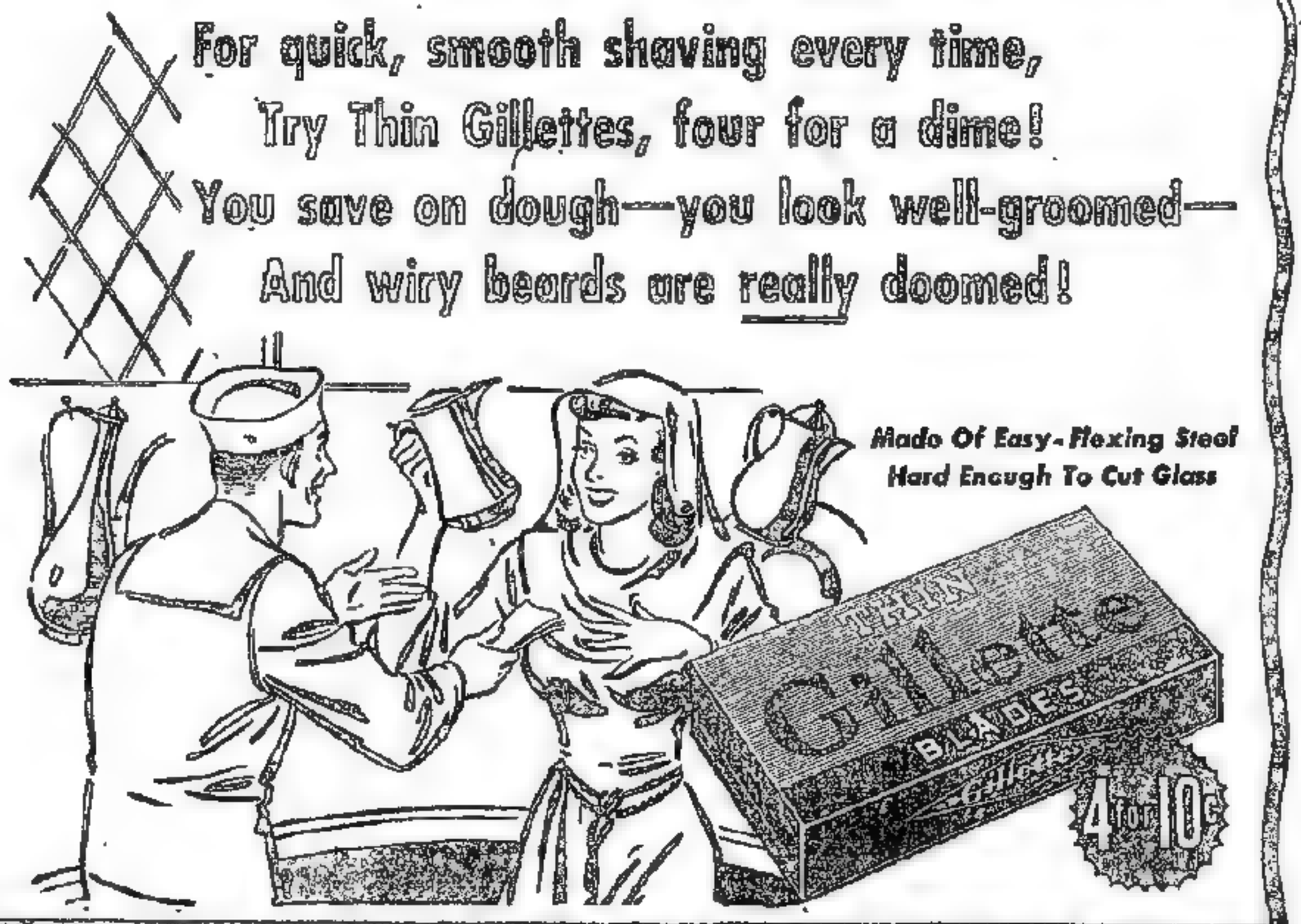


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burned out in half an hour, and by morning there would be a residue of moisture on the ground. The Wheels were waiting around for that.

LEN searched the sky for the stars he had been using as a guide. After he had found them he took a last long look at the inferno that was the grave of Walter, and again set off across the plain toward the City.

But now he was tired, and thirst hit him hard. He walked heavily for a long time, until the sky began to lighten in the east. He scanned the big black dome hopefully for some sign of the City. He didn't see any indication of it.

He sat down. Already the desert was getting warm. In another hour it would be hot.

A man wouldn't last a full day in that desert without water. He wondered if he had much farther to go.

And then he heard a faint shout. "Len! Len Niles!"

He pushed himself up heavily with his hands. The voice came again. He turned around and there was Fred, running toward him.

"Simon and I have been looking for you all night," Fred said breathlessly. "You passed the City!"

Len drew a deep breath and got to his feet.

They reached the dome and kept close to the base while they went around it to the opposite side. Here Len at last saw the mouth of the air-tube. Fred lifted the screen and Len stumbled inside. Coming in from the desert, he couldn't see in the tube. But soft arms encircled his neck.

"Len!" said Avis. Next came his mother's gentle voice.

"Len, you're burned!"

He looked at himself. His glastic tunic was smoky. His arms and legs were a scorched red.

"Well, I'm here," he said. "Let's get busy."

Simon returned from closing the grate. "You made it," he said thankfully. "How about—Walter?"

Len put his blistered hand on Simon's shoulder.

"We got caught in a field of giant fungus just as it matured," he said gently.

Simon pressed his hands to his eyes for a moment, then straightened up and started down the ladder.

"Come on. The ship leaves in an hour!"

## CHAPTER X

### *Heavy Odds*

GRIMLY they gathered around a long work-table in the laboratory underground. Simon sat in the big chair that would have held three of him, and leaned back until his toes left the floor. Old Ben was there, and the other eight workers who had escaped from the Outside—John, who had been sent out fifty years ago, the first Nilesman rescued by Simon—Bob, and Kurt, and James, and Philip, and the others. Len realized, with a start, that Simon was the last who had made his way here from the Outside. That had been twenty years before.

"We have held a meeting," Simon said, watching his fingertips. "The ten of us who have lived Below for these long years. We have decided who shall be passengers on the ship. Because—because for lack of supplies and equipment, only three may go."

Len leaped to his feet. "Only three!"

Simon raised his hand. "Sit down, my boy. We who built the ship have assumed the responsibility of deciding who those three will be. Or, rather"—he spoke carefully—"the others decided. I presided. I say this for a reason." He turned his almost sightless eyes around the table, and there was no sound.

"The decision was not easy," said Simon. "There were many things to consider—spirit, mental coordination, physical adaptation to strange conditions on unknown planets. We have only three space-suits, and little power to operate them. Also, there is barely enough power to send the ship to Planet G, to say nothing of returning."

Simon rocked a moment in his big chair. "It was decided that both male and female should be included, for the possibility that, if they should land on another planet, they might be able to perpetuate the race. The odds, of course," he said, "are that none of the ship's occupants will live long enough for that."

"But—" said Len.

Simon motioned again for silence, and leaned forward until his feet touched the floor. "The three to go are Len, Avis, and Fred."

There was a moment of stunned silence. Len swallowed. He could hardly believe he had heard aright. It seemed ghastly, fan-

tastic, that such a choice had been made!

"You three will be able to handle the ship," said Simon. "Through the years, as we made and tested equipment for this travel, I have made notes recorded in vision and sound on beralloy tape. These are carefully stored in the ship itself."

"Wait a minute, sir! Suppose we do leave in the ship. The Glassmen can't help but see it, and they'll be down here after the rest of you."

Simon smiled. "That isn't so important, but I have prepared a place for retreat. By the time they could follow us there, they will be much too busy with solar affairs to spend time on us."

Len was silent.

Simon rocked forward and got to his feet. "We go to the ship," he said.

"Not—not right away, sir?" said Len.

"Every moment increases the danger of discovery," Simon answered.

He led them up a long tunnel cut through the nitrate. Presently their voices began to echo from far away. Simon touched a button, and the big cavern was flooded with light.

Len had known what to expect, but he was startled. Fred said, "hmp," but his eyes were fixed on the ship before them.

"It's beautiful!" said Avis, her eyes shining.

Simon drew a deep breath. "Forty feet of manganese and magnesium steel," he said proudly. "For thirty years we've been building her. All of us have worked night and day. She's ready now. She's a good ship—and she's yours." He stopped and said no more. None other offered to speak.

In a moment he went on. "All night we've been at a very prosaic job," he said. "We've loaded eight tons of sand as ballast. The ship is named "The Nilesman." It was designed to carry up to twenty persons and equipment, and so we had to add something in place of this weight. Well, are you ready?" he demanded suddenly.

"Why, sir, I—" Len was gazing at the slim cigar shape in the cradle. "I—we—" He turned to Avis and Fred.

Avis' brown eyes glowed. "I'm ready whenever you are, Len."

"Might as well get it over with," Fred muttered.

"Very good."

SIMON waved a hand. Philip, a middle-aged man though he had been Below longer than Simon, pulled a long lever. The nitrate wall ahead of the ship swung slowly back, and before them was the air-tube. Philip pushed another lever. Gears ground heavily, and the ship moved slowly out into the tube.

"Wait!" said Len. "That will cut off the air! The compressor will tear itself to pieces."

Simon shook his head. "The compressor is out of operation for today," he said.

Len's mother hurried up from somewhere. "Here's an unguent that will help those burns," she said.

Len grabbed her and hugged her, then looked up at the ship. It was moving into the tube, straightening around now, ponderously settling itself on the two steel rails laid on the floor of the tunnel.

Simon shook hands with Len for a long time.

"The controls are set," he said. "You need only press the button labeled 'Start.' The takeoff is automatic. The ship will escape the earth's gravitational attraction, and by that time you will have had time to study the tape and learn what next to do."

Len Niles stood straight and tall. "Thank you, sir," he said.

Simon shook hands with Fred and embraced Avis.

"Good luck, my children," he said. Philip had swung open the oval door in the side of the ship. Len pressed his mother's hand and climbed the little ladder and squeezed inside. Avis and Fred were coming. "And may you have many children," said Simon.

Len was startled. Simon acted as if he didn't expect to see them again. But of course they'd be back if they lived. If they didn't live—well, obviously, dead persons didn't have children.

Philip was closing the door behind them. But Len stopped him. He held out his arm and spoke to Simon.

"Have one?" he said casually. "I'll give you one to twenty. You can't be lucky every time."

Simon smiled. He took the package and held it close to his eyes and pressed the release. A hydropone popped up. Smoke curled from it for a second, and then—it went out.

Len stared as if he didn't believe it had happened.

"Okay," he said at last, and took the nitrate disk. "It'll be just as good on Planet G as it is here."

He backed inside, turned the big four-pronged iron plate to hold the six-inch-thick door against the inside pressure when

they got into space. He went into the nose. There a button was labeled "Start."

Len looked around. "All ready?" he asked tightly.

Avis nodded. Her face was white. Fred was convulsively holding onto a rail.

"I'm as ready as I'll ever be," he muttered.

"We're going, then." Len pushed hard. Nothing happened for a moment. The telaudio at his side came on. A Glassman's voice sounded.

"—has been identified as the body of Jebek, brother of Kardox, Number One. Fred Niles is notified to place himself under guard, as a piece of evidence, found near Jebek's body, has been identified as his."

"A little late," said Len. He turned anxiously to the controls. "What's the matter with—oop!"

The ship lurched forward and jerked his feet out from under him. He slid along the metal floor and brought up head-first against a bulkhead labeled "Oxygen Equipment." With considerable effort he got to a sitting position. Avis was pushed back in her seat by the force of acceleration, and Fred was standing flat against a compartment-head.

A muffled, hollow roaring beat on Len's eardrums, but in an instant it changed to a giant throbbing. This grew faster and faster until it was a distant drumming that seemed about to leave them but never did.

"I think we're clear of the tunnel," Len said unsteadily, pulling himself to his feet.

Len was weak all over. Things had happened so fast he'd had no chance to wonder what going through the air would be like, or whether the ship would actually fly. He wondered if it had reached escape velocity of seven miles per second. It must have reached that speed. The steady rise of the ship was indicated by the invisible force which pushed them down and toward the stern. Len wondered why, with so tremendous an acceleration, he was able to stand at all, to say nothing of retaining consciousness. That, he supposed, was Simon's work.

He had time to study the masses of banked dials, flashing lights, levers and knobs. This compartment was small, with not more than enough room for the three of them to move around. There were three flimsy-looking chairs, one in the bow itself, and one on each side before the controls.

THE gravity pull seemed to lessen a little. He made his way forward and sat in the bow. Curiously he examined the seat. It was made of iron.

"Wonder why it isn't glass," he muttered.

Fred felt the chair skeptically. "I'm not much for substitutes," he said, "but I suppose these things will stand up."

Len sat down and tried it. "Feels strong enough. Say, here's a quartz plate set in the floor. We can see the Earth!"

Fred was looking over his shoulder.

"So far as I can observe it's nothing but sand," he said. "Where are the mountains Hart Niles wrote about?"

"They disappeared, if you remember, in the terrible sunspot storms of the year four hundred thousand," Len reminded him, and examined the barometer. "Simon certainly was right about instruments. Our barometer shows nothing—no pressure."

"Here's a dial that shows gravitational pull," said Fred. "What does it say?"

"Earth distance, one hundred forty-six miles," Len read. He looked through the quartz plate. "You can see something blue over there, next to the land. What do you suppose that is?"

"That's water," said Avis. "It must be the ocean."

Len frowned. "It stretches as far as you can see."

"When will we know that we are—safe?" asked Avis.

"Not till we get back on Earth," Fred growled. "Maybe not then."

Len studied the dials. "That one marked 'Ether Speed' says fourteen miles a second. We're all right, then. Our speed right now is more than enough to take us out of the Earth's gravitational field."

"It's too easy," said Fred.

"A good thing," Len said. "If it were not for Simon's careful preparations, we'd never have gotten off the ground."

"We'd better study those tapes that Father spoke about," said Avis.

"Where are they?"

"Here," said Fred. "There's a button marked 'Instructions'."

Len pressed it. A tiny, fast clicking, and then against a black bulkhead they saw the figure of Simon and heard his voice. He was younger in that picture and not quite as stooped.

"These instructions," he said, "were started in the year eight hundred ninety-three thousand, two hundred nineteen, as an emergency measure. They will, we hope, be sufficient to enable any intelligent person to operate this ship."

"That was thirteen years ago," Len Niles whispered.

The picture showed Simon sitting in the big chair. He was heavier, and in the chair, didn't seem so small.

"Since the flight of the ship in space will be largely automatic, it is hoped anyone will be able to start a flight into space without previous instruction."

"Simon thought of everything, didn't he?" Len said.

Then, on the screen, Simon arose and climbed into "The Nilesman." After walking to the bow, he pointed out all the instruments—pressure gauge, gravity-pull indicator, activator-heat, exhaust speed, tube-heats, atmosphere analysis, outside temperature, and a hundred others.

"Since you will if successful, reach strange planets under unpredictable conditions, any instrument such as an altitude indicator would be worthless," said Simon, leaning back against the controls and facing them. "You must at all times consider values, such as the pressure in libas per square inch, and translate that into altitude, for instance, according to your knowledge of the conditions present."

He told them how to set the course. Len turned on the viewing-sphere, and saw the purple-black heavens before them, with stars brilliant as ice against velvet. He identified the constellation Hercules, and carefully operated the individual tube-keys until the ship was headed for the center of the dark mass that blotted out a great portion of the galaxy.

Avis and Fred watched, and then they turned on the tape again.

"Your food," said Simon, again leaning back in the big chair—though this must have been some years later, for he seemed to have shrunk a little—"your food—falcon-eggs, rabbit-meat, oranges, and hydroponic vegetables—is all in dehydrated form and will last a long time. Water is in the compartment so marked. Use it sparingly."

"I'm glad to know that we can eat," said Fred.

AGAIN the scene changed, and once more Simon appeared this time in a close-up.

"Your weapons are the glass pistols invented by Hart Niles," Simon went on. "You will find one for each passenger in the compartment marked 'Weapons,' with one hundred rounds of ammunition for each pistol. It is impossible to forecast whether these weapons will be effective, because the chances are your existence on another planet will depend more on your wit and ability to adjust yourselves than on physical prowess."

"Simon was far-seeing," Len commented.

He changed the tape and Simon appeared again, this time standing.

"By now," he said, "you should be several thousand miles out from earth. There is still a great deal of time to study these reels of tape and the equipment which they describe. One important item is the space-suit." He held forward a bulky suit equipped with a big helmet. "These you will find in their proper compartment. They should be used whenever you first step out on a strange world. They are flexible glastic, especially processed and unaffected by anything but the fluorides. They are as perfectly insulated as possible, and equipped with small but efficient heating and refrigerating units. You will be able to endure absolute zero for approximately four hours, or heat up to twenty-one hundred degrees for two hours."

He lifted up one of the suits and pointed with his finger. In the back of the helmet is oxygen equipment sufficient for six hours' breathing if used sparingly. Also"—he pointed—"there are tiny audio sets, sending and receiving, in the top of each helmet, for talking among yourselves. Their range is approximately five diameters under Earth conditions. All these are controlled by switches on the breast of each suit. And finally"—he paused and looked squarely at them—"there is my invention, the thought transmitter, which, also in the top of each helmet, picks up the infinitesimal electronic waves from other brains and injects them into your own thought-centers, where they emerge as ideas easily translatable into definite words. If you should come into contact with highly intelligent beings, no doubt they will by some similar process understand your own thoughts."

He set down the suit and retired to his big chair. "It is this development which has given rise to the legend that Glassmen can read minds. I used it to a limited extent before I was banished, but the Glassmen, though they suspected, never discovered its secret."

"Wait!" said Len. He snapped off the machine. "Let's see if it works."

He found the suits, detached the helmets and handed them out, put on one himself. Then he discovered the switch was on the breast-plate of the suit, and started to put that on.

"Wait," said Avis. "There are switches on the side of the helmet, too. This one is marked, 'Thought Transmitter'." She

pressed it. Len pressed his, and then smiled at Avis.

"You are thinking how masterful I look, with my light hair in waves and my eyes shining," he said.

"And you are thinking that I am the nicest person in the world to be marooned with on a strange planet," she promptly answered.

"Don't pay any attention to me," Fred growled, and Len and Avis both blushed. They took off the helmets, and Len again started the tape.

"The anti-gravity units in your suits gave me the most trouble," said Simon's voice. This recording must have been recent, for his face was deeply lined. "Their power comes from a rare material prepared from uranium. Only a small portion of that can be separated into this anti-gravity substance, which I have called actino-uranium, and about which I still know very little. It was discovery of this substance which led to my banishment from the City. Later I destroyed the formulae. Actino-uranium is very powerful, and there is ample in each of three space-suits for perhaps one day's use."

"He must have made this tape only this morning," said Len, amazed.

Fred broke in. "But he hasn't said anything about the ship itself. If Planet G's pull is so strong that light cannot escape from it, what can we do there? How can we land? We wouldn't even be able to communicate. There wouldn't be any air waves. Even electrical impulses would be drawn into the ground. Suppose we did land safely. Certainly we'd never be able to get off."

THEN, like an answer from the past, came Simon's voice. He must have paused, in making the tape, long enough for them to assimilate the very idea that Fred had voiced.

"There is no possible chance for you to approach Planet G," he said, and his voice was weary and slow. "You might land, but you would never have enough power to get away. And you could not live on such a planet when your actino-uranium's power is dissipated. Such facts you must already have realized while I was talking. And this you must do, Len, and Avis, and Fred: You must flee this solar system, find a new galaxy, a new system and a new planet. There will be many inhabitable planets in the universe of galaxies, and you must try to establish yourselves on one. Earth and the City of Glass are doomed, irrevocably. You must forget the City of Glass, forget the Nilesmen—and save the race. Len Niles, you are the leader. I am addressing these instructions to you. Good-by, my son, my daughter. Good-by, Len Niles. The future of the race is in your hands."

The tape flickered out.

Len Niles listened grimly. He looked at Fred and Avis. Both appeared to be stunned by these commands.

"Asteroids!" said Len suddenly. "What intrinsic value is there in the race? Suppose we do perpetuate the race? What about our families, the other Nilesmen, the twenty-three hundred Glassmen who voted for a Nilesman? They all have the right to a chance at life. And Simon and Ben and Philip and the others, who worked forty years Below? We owe them more than we owe the race. Idealism can go too far."

He was standing in the center of the tiny cabin like an orator. He stopped.

"I think you're right, Len," Avis said soberly. Fred grunted.

"I'm in favor of going on to Planet G," said Len Niles. "I don't know what we'll find there and I haven't any idea what we can do, but Planet G is the cause of our trouble and the only way to lick the situation is to get there and try."

"I'm in favor of trying," Avis said quietly —a little too quietly.

"What's the difference?" growled Fred. "We've got the whole universe to get lost in. We haven't got a chance to come out alive, no matter where we go. I'll string along."

"Then we'll hold the course," said Len Niles.

It was all too much for Avis. Len reached her just as she fainted.

## CHAPTER XI

### *Planet G*

ONE thing soon forced itself upon Len Niles' attention. They had no way of telling time.

According to the ether-speed indicator, they soon approached and far surpassed the speed of light.

"But that's impossible," cried Avis.

"Perhaps not," said Len. "You will recall that a man named Laplace, according to Hart Niles' notes, estimated the speed of gravitation at five hundred fifty thousand times the speed of light. With our anti-

gravity unit, it may be that we can approach that speed."

"What's a difference of a few million miles, either way?" Fred demanded.

As their reactions and their chronometer slowed in accordance with their speed, time—relative to earth—had no more meaning. Actually, their chronometer showed one hour and twenty-five minutes had elapsed when they entered the blacked-out area at the center of which they believed was Planet G. Somewhere in there, although it wasn't visible, was the cause of their trip into space. But Len worried about the time.

Suppose they had already been gone for several days—or even weeks. The speed dial showed a marked lag. But perhaps the speed-dial itself wasn't reliable under such conditions. Time, speed—everything now was relative. Possibly the Earth already had been destroyed by terrific storms, mountain-rending earthquakes, huge tidal-waves.

But Len grimly went ahead with his plans. They would do what they could—and hope. They had studied and re-studied Simon's instructions, but Len always stopped the last reel short of Simon's final advice.

After they had entered the black area, all light disappeared except from the interior of the ship. They relied entirely on instruments, and especially on the gravity-pull indicator.

"If my figures are right, the pull of Planet G will run something like thirty-three million gravities," said Len. "That must be why this indicator has ten different dials. Certainly, with such a pull, there will be no atmosphere and no pressure at the surface of the planet. Everything will be solidified."

The ship took a wild lurch that threw them all in a heap. Len struggled to his feet and stabbed at the control-levers.

"We must concentrate all anti-gravity power in the central tube," he said.

Presently the sensation of falling began to ease.

"We're over the planet now," Len said. "Or under it—or something. Anyway, not far from the surface. I think we're circling."

Avis watched the dials at her control station. "There seems to be a soft spot," she said. "We are going at terrific speed, but every few seconds the needle jumps back."

"Then that spot is where we land," said Len Niles. He had been manipulating the speed-controls, and the pull toward the bow of the ship showed they were slowing.

"Ether-speed is down to twelve thousand miles a second," announced Fred.

"I'm cutting more and keeping all available power in the anti-gravity tube," said Len.

Through the viewing-sphere he could see nothing, not even the blasting white light from their tubes, but he could feel the drumming of the activator.

"Get into your suits," he ordered. "Check oxygen and audio units, heat and refrigeration units. Hurry. We're going down fast. I don't dare try to hold her by anti-gravity alone."

A moment later Fred and Avis were in their suits. Fred grimaced. Avis smiled at him and tried to push her brown hair into place. She said something, but Len couldn't hear. He couldn't make them hear, either, through the helmets. "How am I going to get my own suit on?" he thought.

Instantly Avis came forward, smiling, and took the controls. He stared at her. Then he remembered. Thought-transmitter. He got into his suit quickly and was back.

"I'll take it now, my dear," he said.

No answer came from his audio, but somewhere in his brain, like a clear thought, was something that meant, "Why does he say, 'My dear'?" He grinned and thought rapidly. Avis blushed and stepped back.

"Heck of a time to be courting," came Fred's thought.

They all looked at one another and smiled. Then to work, each one concentrated on his part of the controls. Their coordination was perfect. No words needed to be spoken. A thought was answered by an action.

The gravity needle rose and fell. Speed dropped interminably. And finally they were over the soft spot, with speed almost zero. Len inched her down. Presently came a bump, a grinding, and the ship was still. They looked at one another and Len drew an enormous breath.

"We've got to test the air," said Fred.

"That won't be necessary. There won't be any air on such a planet. All we need to do is see that all units of our suits, especially the repellers, are in good shape."

LEN had his suit on first. He helped Avis and checked her oxygen, then clumped to the air-lock.

"I'm out first," he said aloud.

"Asteroids to you," said Fred. "I'll go first. You stay in the ship. Who knows what we'll run into out—there?"

"Fred's right," said Avis. "You should stay with the ship until he finds out."

Reluctantly Len sealed Fred in the air-lock. He clumped back and forth, waiting, waiting. Avis sat huddled in her iron chair.

Then Len jumped. A thought in the helmet—Fred's thought. "Looks all right, what you can see—which is nothing. It's blacker than a coal-mine on Neptune, but I'm still alive."

Len helped Avis, and then went himself. He climbed down from the air-lock door and his feet touched the surface of Planet G—a new world, a strange world, a dangerous world.

He felt Avis at his side, and then Fred. They couldn't see even the outlines of one another. Len started to turn on his light.

"I tried that," came Fred's thought. "No effect whatever. Better save it. The light-rays fall straight to the ground—or whatever this is. We won't be able to use the audio, either. Apparently the thought-wave transmitter is working, though."

"It feels cold," said Len. "Better use your heaters."

"My soles are warm," said Avis.

"I suppose the planet itself, where it is solid, could be warm or even hot, but an inch away it may be absolute zero."

"What shall we do?" asked Avis. "We'll be lost the instant we take a step."

"I left the direction ticker going, as Simon instructed. I can hear it. I think the waves travel through the ground and into our bodies as vibrations. We'll be all right. Simon is a genius. Take my hands, each of you."

He couldn't see either of them, but he felt Avis' hand on his left and Fred's on his right. He knew the left one was Avis', because it seemed to rely completely on him.

They walked away from the ship. "The ticker's getting fainter," said Fred. "We'd better go back."

Avis' thought sounded suddenly. "I can see!"

Len realized then that he had heard her voice, faintly but certainly.

"Some change is going on here," Len said wonderingly. "I can see a little, too. It's hazy, but I can see your space-suit."

"Maybe we're approaching the center of the 'soft spot'," said Fred.

Len was examining the ground. He turned on his light again, and now it was like looking through a dense fog. He bent close to the ground. "It's like yellow ice. Probably solid helium or something."

"What a place to live," Fred growled. "No night, no day, no seasons, no weather. Certainly nothing could live here."

"We are still living and we're here," answered Len.

Suddenly he thought of his anti-gravity unit. He bent close and peered at the needle.

"Still full of power, I think."

Abruptly Avis dropped his hand and pointed. "I see a light! A glow!"

Len stared. "Sizzling Comets! You're right! It is light!"

"And a city!" cried Fred.

It was a city. There were the definite outlines of structures arranged in geometrical patterns.

Avis started to run forward, but Len stopped her.

"Wait a minute Cities mean living beings —and we don't know what they're like."

He wanted a minute to think. It was almost too much to grasp. Here was Planet G, of unknown mass and incalculable force. They had landed on it but they were still alive. And here was buildings not made by nature.

They went forward cautiously. The shimmering haze lifted like fog scattered by the morning sun, and the city became clear and distinct in a soft light that had no discernible origin. The structures were of great weight and tremendous strength—turret tops, sides of smooth, heavy steel and massive rounded corners.

Gingerly they walked down the middle of an iron-paved street. There were breaks in the smooth walls that indicated doors—doors of great width and height. But no windows. Nowhere was there anything that indicated any opening other than the solid steel doors —and these all were closed.

"What kind of place is this?" whispered Avis.

THEY turned a diagonal corner and a dazzling light burst upon them, forced them back a step. Then Len remembered one of Simon's instructions. He felt at the top of his helmet and pushed a treated glass into place over his eyes. The brilliance of the fire was strained out, and he could see clearly. Fred and Avis had caught his thought and were doing the same thing.

Below them, set in a square in the street, was a huge iron pot with an open top. It was filled with a liquid that burned with a fiery orange-red heat, and around it were a dozen creatures—creatures that looked like robots. Some were massively built, others were slender and graceful, but all, when they moved, showed ponderous, terrifying strength.

They seemed to be finishing some kind of ceremony. One, of medium build, walked up iron steps to a small platform, and the

three Earth-people felt the shudder of the ground as he stepped. He moved a lever, and Avis gasped.

The creatures around the red-hot kettle stood still, while from above the pot a chain rattled down.

At the end of the chain dangled another creature.

Avis screamed.

The creature at the end of the chain dropped slowly into the molten liquid until he was out of sight, then the chain reversed and he came back up.

The red-hot stuff dripped from him and spattered back into the pot with ground-shaking splashes.

"It isn't hot enough," came a thought. "Raise it a hundred degrees—and remember, I want at least two hours in the cyanide."

Abruptly two huge electrodes, one at each side of the pot, jumped into life. Giant sparks as thick as a man's leg roared and crackled for a moment and then died away to a steady hum.

The chain started down again.

Avis grasped Len's arm.

"Len, I'm afraid," came her uneven thought. "Let's get back to the ship and leave!"

But Len Niles continued to watch the creatures in the square.

"We haven't enough gravity-repellant to get away," he said gravely. "Whatever there is here, we have to do the best we can."

Then a strange thought sounded in his brain. It had a distinct personality, not soft like Avis' or harsh like Fred's, but almost—metallic.

"If you are Ferro's men get back to your low hysteresis and your magnetic permeability," the thought resolved itself in his mind.

LEN shook his head and blinked his eyes rapidly.

Other thoughts came in a confused jumble. "Let them come on, if they want to."

"Why case-harden him, anyway? We'll all be dead in a million years."

"But he applied for it."

"I still think he should have been nitrided."

"No, the old-fashioned way is best. I don't trust these new-fangled methods."

Then a clear, sharp thought came through all the rest. "Pay no attention to the intruders. A million years isn't much, but we can at least go on as we always have."

Len tried to separate the thoughts that continued to impinge on his mind with bewildering rapidity.

At once the entire group of creatures straightened and looked at him. Flashes of quick, sharp thoughts followed.

"Who's out there?"

"Ferro's spies," came the instant answer. It wasn't put into words but as in instantaneous thought. "They can't wait for us to die."

"No," said another. "Their thoughts are strange. They're not Ferro's men."

A sharp flash impinged on Len Niles' brain, and the thoughts ceased instantly.

The creatures turned simultaneously. They left the one immersed in the pot, and came toward the three Earth-people. They possessed three legs, round like iron bars, two of which were always planted on the ground while one moved forward. The action rotated so that each leg moved in turn. The creatures were perhaps a head taller than Len Niles. Avis pressed closer against him.

A DEMANDING thought rang in Len's mind. "Who are you?"

Len swallowed, then answered boldly. "We are three from the solar system. We come in peace."

"Where is Solarsystem?"

Len pointed at what should have been the sky. "Up there," he thought back. "Many billion miles. A sun and nine planets."

"Ten planets, he means," another thought contradicted him.

But a correction came instantly, one that made Len's heart heavy with apprehension.

"Only eight, now."

The Planet G beings had approached close enough, now, for Len to see them clearly. They appeared to be made of metal. Some were dull in color, some shiny, some black. They varied in build. The dull colored ones seemed to run to heaviness, while the shiny ones were more slender. But all were of the same height. Their torsos flowed smoothly into heads, but the heads had no eyes, no ears, no nose, no mouth—only a single screen grid in front. Each being had four arms, one at each side, one in front, one in the back. Len could discern three fingers at the end of each smooth, rounded arm.

There was a brief pause. Then from a dozen sources all at once, came thoughts, and all were the same.

"They are not Ferro's people."

Next a quick, authoritative mind took charge.

"Call Tungsto," he commanded.

## CHAPTER XII

### *Immutable Death*

REALIZING that quick wit was the only thing which could save their lives, and how much depended upon him, Len Niles rose to the emergency. In the speech of a couple of seconds his mind worked harder than it had ever done before. At once he threw out a brief sharp mental message.

"We are friends!" he shot forth. "Do not harm us. There's no need. We come in peace."

"Wait where you are," came a cumbersome answer. At once some kind of signal went out. The creatures drew back to the sides of the street. And presently, with peculiar alternating thud, down the center of the street came a medium-built creature, somewhat larger than the others. His highly polished steel legs moved with one-two-three precision. There had been a jumble of thoughts of many timbres—some high, almost squeaky, as of rusty parts moving together, others sharp and incisive. But they stopped abruptly as the new one approached.

On each side of him and to the rear marched a stiff-legged, black-scaled attendant. The leader stopped and his three legs braced themselves under him. His attendants also halted. There were no random thoughts in the transmitter.

"I am Tungsto," thought he of the highly polished exterior. The creature waited for an instant, perhaps catching their thoughts. "Come with me." The thought was as clear as spoken words. "I will take you to my foundry."

Len Niles took Avis' hand and looked at Fred. Fred was on the other side, and his spoken words came to Len.

"What in the center of a c0 star can we do if we don't go?"

They moved forward slowly. Avis' hand held Len's as if she would never let go, and Len himself was filled with such tense excitement he found it difficult to breathe. They followed Tungsto past the fiery kettle, where the member left behind was still under the surface.

"Are you comfortable?" came a thought, apparently from Tungsto.

"Quite," was the answer that bubbled from the vat.

They stopped before a steel building bigger than the others. The door swung open ponderously, and they entered.

"What can we do if they seize us?" said Avis with a shudder.

"Let's depend on diplomacy," answered Len.

Tungsto stopped, with all his legs under him like a massive three-legged stool.

"I see you are not used to maintaining yourselves erect," he said. "You may recline on the floor if you wish. You are quite safe —for the present, at least."

Tungsto looked for all the galaxy as if he were fixed in place for the next ten thousand years. Len sat cross-legged on the floor against a wall, as well as he could in the cumbersome suit. Fred and Avis took places beside him.

"Now I know your names, and I know why you are here, but I doubt that we can help you," said Tungsto.

"You know what is happening to our Earth?" asked Len.

Tungsto nodded.

"Isn't there anything that can be done?" Len persisted.

Two of Tungsto's fellows came in and stationed themselves by the door, each propping his three legs under him in such a way that he couldn't possibly fall over, and then settled with that air of being fixed for centuries.

"I'm afraid not," said Tungsto's thought. "I'll tell you why. Our planet is little larger than your Sun. It is almost entirely iron except for the core, which makes up a third of its volume. It is, of course, very dense. Your earth would be a vacuum to us."

"A vacuum?" said Avis, puzzled.

Tungsto's steel head nodded. "We would sink right through it," he said. "Our core is of the element we call"—a pause—"your word, I think, is nebulium. It's Number Ninety-two in the third bracket of elements. I see you are familiar with none but the middle bracket. There is of course a lower bracket of lighter element—oh, hundreds of times lighter than your—yes, that's it, lithium or hydrogen—and then there is the cosmic scale of heavier elements, of which nebulium is at the top, the heaviest in all the universe."

Len took a deep whiff of oxygen. He wished he could reach a hydropone, but they were inside his suit.

"Nebulium," went on Tungsto, "is Number Two-seventy-six in the table of elements—and it is the element that exerts all the force of gravitation."

"Gravitation," muttered Fred.

Len stared at Tungsto. "Then," he thought slowly, "this element, nebulium, itself exerts thirty-three million gravities!"

TUNGSTO studied the word "gravities," then he made a peculiar quick motion of his head that seemed to serve as a smile.

"The force of nebulium is one gravity," he said. "Your earth has such a small amount of nebulium that it exerts only one thirty-three-millionth of a gravity." His screen grid turned toward them for an instant. "Nebulium exists in minute quantities in all matter, but you can't detect it because of its force. Some eight hundred thousand years ago, your scientists had what they called an electronic telescope—the first step in escaping your slavery to light. But this didn't go very far."

"Now I understand," said Len. "Nebulium holds light rays and so it wouldn't be detectable in a spectroscope."

"Yes, and the speed of its emanations is another factor. Gravitation has half a million times the speed of light. But you were never able to isolate nebulium as an element because of its presence, in extremely minute quantities, in all matter everywhere. This is why everything with mass has an attractive power."

Len listened intently.

"Our planet has at its core more nebulium than all the rest of the universe combined," said Tungsto. "This planet—which you call Planet G, I see—was in fact originally the core of the universe itself."

"Bright rings of Saturn!" Fred thought in amazement.

Len was bewildered. On such a planet, I don't see how any living thing could come into existence. Maybe you're—well—mechanical men."

Again the screen grid was turned toward him with the quick gesture which might have been interpreted as a smile.

"We are quite—human, like yourselves, if you will forgive the analogy. That is, we are—or were—born, somewhat as all living being are born. We are viviparous, and our period of normal life is unlimited, depending only on our ability to preserve functions of the metal of which each one happens to be made. For we are composed basically of iron and steel, of many different kinds and grades."

"Iron!" exclaimed Avis. "How strange."

"Remember we are carbon people, and the Glassmen are turning toward silicon," Len said thoughtfully. "Why couldn't it be iron?"

"Of course, many of us, in the course of evolution, have come to be non-ferrous," thought Tungsto. "But in the beginning iron was the most plentiful and it existed in a myriad of forms, many of which are assimilable."

"Just as we are made of carbon," Len supplemented.

Tungsto turned toward him. "Carbon? I don't see how that is possible. You can't assimilate coal or graphite or pure carbon or—he hesitated until he caught the picture from Len's mind—"or diamonds."

"Carbon occurs in an infinite number of compounds," said Len.

"But iron?" persisted Avis.

"So might iron occur in forms about which we know nothing," Len said. "We, too, must have some iron to live. So there's no reason why iron can't be uppermost instead of carbon."

"That's true," Tungsto agreed. "Of course we, also, must have small amounts of carbon, or our bodies wouldn't stay together, wouldn't have the properties necessary for life."

"But are you born with those—grids?" asked Len.

"We are born with life, but our facilities for perception are installed mechanically as we grow up."

Avis' thought came through. "What were you doing to the man in the big kettle?"

Tungsto turned toward her. "He is a cold-rolled-steel man and he was wearing badly on the outer surfaces and particularly in the joints. He's only a couple of hundred thousand years old, you know, and so he decided to be case-hardened—though what good it will do him I don't know." Avis looked bewildered. She started to ask a question, but Tungsto looked at Fred. "No, we don't eat," was his thought. "All activation comes from rays from the planet."

Len got cumbersomely to his feet. "Now," he started to say, "I suppose—"

"You want to know about our planet—why it is disrupting your Solarsystem?" said Tungsto.

"Yes," said Len. "And if anything can be done to stop it."

Tungsto shook his head sadly. "Im afraid nothing can be done," he said again.

AVIS was on her feet now, too. Impulsively Len caught her elbow to steady her. He didn't feel steady himself. This Tungsto, the Iron Man, who knew more of science than Earth-people would learn in a million years, said nothing could be done. Len closed his eyes for an instant.

"You see," said Tungsto, "under the shell of the planet is a mass of complex machinery, practically—ah, automatic is your word—to balance gravitational forces and con-

trol our movements. Back in the Beginning, as the hard, solidified ball that was the Universe began to break up from internal pressures, our iron ancestors, who evolved at about the same time, developed controls to prevent these outflung masses of matter from being drawn back and destroying the planet and the race. We developed also means of controlling the planets' movements, and with this machinery the Iron Men have kept this planet out beyond the edge of the cosmos for billions of years."

Len's eyes popped open. They were shining now.

"You mean—machinery that lasts—millions of years"

"Yes, of course."

"What wonderful iron and steel you must have!"

Tungsto made that peculiar movement that was like a smile. "After all, you know, we're made of iron, and we've used the metal, as you call it, from the Beginning of Time itself."

"But why?" asked Len. "Why—after all this time—have you brought Planet G back into the galaxy? You will wreck the entire universe, and yourselves along with it. Even now the system is beginning to disintegrate."

"Yes, I know. Your Earth is being pulled away from its sun; and your four outer planets are leaving also—if, indeed, the sun itself is not destroyed very soon." He hesitated. "In the last ten million years there has been trouble between two groups on our planet," he said, and emitted a mental sigh. "It seems that all living things tend to split into two or more groups. There hasn't been much incentive for my group to continue its work. It has always been the duty of my side to adjust the machinery for control of the planet, but my race is dying out and so we have—partly from discouragement in our own future, and partly from lack of available energy—neglected this duty."

"Dying out?" said Len. "But you said you could live almost indefinitely."

"Normally, yes, we live forever. But now we suffer from racial—anemia, as you might say, because of the extreme scarcity of a particular non-metallic element that is necessary to cleanse the iron of which we are born. Also we use it to maintain a certain amount of magnetism in our bodies. Without this magnetism we can't exist because it is acted on by radiation from our planet and enables us to move about, to send thoughts, to perceive, and so on."

"I don't see how that could work," said Fred. "Could you explain it a little?"

Tungsto turned toward him. "Remember that we live under what to you are strange conditions. The attributes of elements and even of electricity change unbelievably at times."

"You mean like helium at absolute zero?"

"Yes."

"Incidentally, what you think is solid helium on the surface of our planet is not helium," thought Tungsto. "It is tillial, element Number One, in the first bracket—the lightest element in the universe. It is so light that it has not occurred on Earth or in Solarsystem in any form, because there is not enough nebulium in your sun or in any of your planets to hold it. You may be interested to know that helium never solidifies at any temperature or at any pressure. It does, in fact, become embium, an element in the third bracket, at minus two hundred seventy-three degrees."

"I see" exclaimed Len. "That is why it apparently defies the law of gravity at that temperature."

"Exactly. It is a weak counteractive to nebulium."

"And that is why pressure will not make liquid—well, helium—flow faster," Avis put in.

"True, though cold will make embium flow faster."

"And we know that lead and tin and mercury lose their electrical resistance near absolute zero, so that a current introduced in them will flow forever."

TUNGSTO made that queer movement that meant a smile.

"That's true. But those behaviors are only elemental. The middle bracket is composed of simple elements whose reactions can be pretty well predicted. When you get into the lower and higher brackets, reactions become vastly more complex, and they increase still more in complexity in the heavy pressures and extreme heat and cold which can be induced on a planet like this. In fact, for a long time we thought we would be able to produce a substitute for the element necessary to our existence, but" —the mental equivalent of a sigh—"we could find nothing with a permanent effect."

"What is this substance the Iron Men must have?" asked Len.

There was a hesitation in Tungsto's thoughts. "I cannot seem to find in your mind a name for it. The nearest I can come is flintrex. It is in the middle bracket, but it may not be present on your Earth, be-

cause it occurs in only minute quantities throughout the universe."

"And you have no more?"

"There are less than two hundred of your pounds left in all of Planet G," Tungsto said sadly.

"How much do you need?"

"A pound or so every ten thousand years. We older Iron Men will continue to live until we are killed by accident, but those who were born in the last million years have a limited time to live."

"But two hundred pounds would last twenty million years," said Len wonderingly.

"Ah, but that is only tomorrow!" said Tungsto. "We must look to the future. And besides, you see, the entire supply of flintrex is now controlled by Ferro's men. There is no hope for us."

## CHAPTER XIII

### *A Desperate Plan*

EVEN as Tungsto was communicating these ideas, a desperate hope and a wild plan was commencing to shape itself in Len Niles' active brain. His main difficulty would consist persuading Tungsto to accept it. Len set his lips stubbornly. It was too late to turn back. He must succeed. He could not afford to fail.

Len thought fast and then turned to Tungsto. "You older men live forever and so I still don't see why the later generations shouldn't manage to do it also."

Tungsto shook his steel head. "It is hopeless. There is no future, no hope for the race. When we are destroyed, as we must be eventually, there won't be anyone to take our places." He stirred his three legs slowly. "Come, I will show you what happens to the younger generation."

They followed him and his escort past the square, where three Iron Men were pulling the now case-hardened member from the molten cyanide.

"I'll get a hardness test and let you know," said the case-hardened man.

"Fussy for a man who is doomed anyway," observed one of the three others.

The Earth-people followed Tungsto, who stalked along on his three legs, up a diagonal street and into a large building. Inside were a hundred or more Iron Men, some shiny, some rusty, some with a black scale on the outside.

"These," said Tungsto heavily, "are our people. Their perceptions are dulled and they can no longer move freely, so they have come here to die."

Len looked at them with narrowed eyes. The Iron Men all were propped up on three legs, and he could see little difference, at first.

"Here, in the corner is a forged-iron man," said Tungsto. "He has been here the longest and is about ready to collapse. Hamo, can you hear me?"

Len grew tense himself at the terrible struggle that began in the Iron Man when he tried to answer. There was almost a quiver of his body, but not quite. The front arm tried to lift—that was perceptible. One finger even twitched. But it didn't succeed.

No thought came through. Still the struggle went on.

Tungsto stood there silently, shaking his head.

Suddenly with a crash like thunder, one of the three hip-joints gave a little. The Iron Man settled a fraction of an inch. A crack appeared in the iron.

"You see?" said Tungsto, and his thought was heavy with despair. "We have nothing at all to live for—but that. As his magnetism is dissipated, his body increases in weight until it is as heavy as you would be without your anti-gravity units."

"But can't you carry him to the radiation area?"

"We could have, eons ago, but it wouldn't have helped. His body won't retain the force, since he was born with less than half the necessary amount of flintrex."

"Will he just stand there and die?"

"His torso will crack and his legs will give way in another one hundred years. Then he will be completely destroyed when his body crashes on the floor. But already he is losing blood steadily. Look there."

In the crack of the Iron Man's hip a tiny bubble was forming. It grew into a drop of silvery-white that shimmered with Hamo's still unceasing struggle to transmit a thought. The drop grew larger in the edge of the crack and fell—fell with a terrific crash. The steel building rocked and for a moment Len Niles thought it would fall on them. Avis and Fred ran to the wall, but Len just stood there, watching Hamo. The Nilesman's jaws were hard.

He stood to examine tiny pin-points of Hamo's blood that had scattered where they fell. He put a finger on one. The top gave a little. He tried to push it around, but the friction created by the pull of the planet was so strong he couldn't move it at all.

"It looks like mercury," he said wonderingly.

"It is mercury," said Tungsto. "It loses all its repellant power when it leaves the body."

"Let's go," came Avis' voice. "I can't stand it. These people dying—everything." Her voice was quivery.

"Yeah," Fred muttered. "Like a graveyard, with the people buried but not yet dead. Just dying."

They filed slowly outside. "But this flintrex," Len said, frowning. "Can't you give us a sample? Maybe we could help. There's just a chance—and you need it so much!"

Tungsto shook his head. "We have none whatever. Every particle is in Hematite, Ferro's capital."

"My arms are getting heavy," Avis said suddenly.

LEN looked at the dials on his chest, then he spoke quickly. "Our gravity repellant is losing force. We'll have to get back to the ship—fast."

"We can't find it," said Fred. "We can't see out there."

"Here," said Tungsto. His front arm held out a tube. "Here's an activated light. You can see enough with it to find your way. And I think I'll go with you." He hesitated, and Len caught a thought that Tungsto had not meant for him to receive.

"You mean the light gravity bothers you?" Len said quickly.

"The lack of gravity," said Tungsto. "I would think conditions on your planet are intolerable. It seems there wouldn't be enough pull to hold you down."

Fred looked at him, and then spoke to Len Niles through the audio. "I suppose we won't be able to leave the ship again at all," he said.

"Yes, we will," Len said grimly. "We have some antigravity stuff in the ship's controls. We can use that. "We're going to help them get some flintrex from Ferro—some way."

In ten minutes they were back in the small cabin of "The Nilesman." There they took off their suits, and the pull of the planet didn't affect them. Avis shook out her brown hair.

"I'll fix something to eat," she said.

"Any way I look at it we're sunk," said Fred. "You say already we haven't got enough gravity repellant to get the ship off the ground, and if we take some of that for our suits, things will be worse."

"The only possible chance for us to get away from Planet G is to get some of the stuff they have on this planet," Len said thoughtfully, cracking a falcon egg.

"Will the metal in our ship react as theirs does?" asked Avis.

Len considered. "Probably not, but if we had some of the stuff actually in the ship, we'd be all right. If we don't—well, Planet G is powerful enough to pull the whole system into us—and you saw what happened to Hamo."

Avis shuddered. "How much would we weigh, do you suppose, without any kind of protection?"

Len calculated. "In the neighborhood"—he was forced to smile—"of six billion pounds. Some three million tons. I hate to think what a splash we would make on Planet G's solid tillial surface."

"Well!" Avis, arched her eyebrows. "I'd better start reducing."

Len Niles eyed her. "You stay just as you are."

Her cheeks dimpled. She smiled.

"Now that that's settled what do we do?" said Fred sarcastically. "We might as well sit here and eat falcon-eggs and wait for what is coming."

"No, we won't," Len said decisively. He leaned back and put his feet up on the repellant-tube locker, stretching his toes and watching the nail on his left foot. It was getting close to the end of his toe. "From what Tungsto said, the Earth must be still under the influence of the sun. If we could stop this cosmic runaway now, we could save the City of Glass and our people in it—and the Glassmen."

"It's all right, except that part about the Glassmen," said Fred.

"We'll take all the gravity-repellant we need from the ship's controls for our suits," said Len. "We'll try to get some flintrex for Tungsto. If we do, then they'll have something to live for. We can persuade them to take Planet G somewhere else. If we do it soon enough, that will save the earth."

"And if we don't get the flintrex, we three will last about twenty-four hours before the gravity gets us," said Fred gloomily.

Nobody answered.

Avis and Fred rested and slept, but Len was restless. He stayed awake most of the time. Presently Fred got up, and they heard Avis stirring. Len took one of the two remaining tubes of the precious repellant, divided it into three parts, and put it in their suits. They ate, donned their suits, and started back to Tungsto's dying city.

Tungsto himself met them before they reached the square.

"I sensed your thoughts," he said. "You seem to have a plan."

"It's more determination than it is plan," said Len Niles. "I think it's time for a conference."

THEREUPON they conferred.

Some hours later three thousand of Tungsto's best men gathered on the outskirts of the city and they started a march through a black area of Planet G to Hematite. Len Niles had suggested infiltration, rather than a frontal attack, and this idea delighted Tungsto.

"Ferro's people won't realize what is happening until we are almost there," he said. "We may have a chance."

"Of course," Len answered. "But they'll smell something when they see your men."

Tungsto hesitated. There seemed to be confusion in his mind.

"'Smell'?" he repeated.

"Yes. An odor. It's something like—like—well, things give off an—a—hm. Oh, it's just an extra sense we have."

"Ha!" said Tungsto. "That's interesting. I perceive no analogy for it here."

"I meant Ferro's men will know something is up—I mean happening.

"That will not occur at once," said Tungsto. "Hematite is not as well supplied with gravity repellant as our city, and so the light is not as good."

"But aren't there differences between the two races?"

"Very little," said Tungsto. "We identify each other by comparing the relative intensity of certain thoughts."

Fred was at Len Niles' side, sourly eager for action. Len suggested leaving Avis behind, but Tungsto objected wryly.

"On this planet there is no distinction between male and female except for child-bearing. Of these three thousand you see here, about half are what you call women."

So Avis went along, too. Before they left, Len got an activated three-cornered bucket to carry. Fred shrugged.

"Optimist, eh?"

The infiltration went well. Tungsto's men—and women—masked their thought-transmitters. At a high point, from where they could watch the small but massively-built molybdenum globe that held the flintrex, Len and Tungsto saw the invading forces gathering quickly and steadily near the precious container.

"They should meet resistance soon," Tungsto thought anxiously, his thought-transmitter on low power. "Ferro must have discovered many of our people and will have gathered a force to meet us."

The first line of Tungsto's men formed before the globe. It began to look as if they would meet no opposition, but suddenly, from behind the container rushed a hundred of Ferro's warriors, who formed a double-line and waited.

Tungsto's transmitter opened up to full power.

"Cast-iron group, prepare to fight! Column of lines, plan A. Attack!"

The rusty Tungstonians formed themselves into three long lines and lumbered toward the Ferrians. They hurled their massive forms on the defenders with a great grinding and clashing which, because of the low anti-gravity in this area, sounded like the noise of a great battle in the far distance. They kept their arms to their sides and backs and fronts, and depended on sheer weight and impetus against Ferro's men.

Clouds of gray cast-iron dust arose in the air, lost resistance, and fell to the ground with jarring force. In a moment the small plain was strewn with broken bodies. Mercury began running along the ground, following a slight grade and gain in tremendous speed as it rolled.

Hardly did Len have time to comprehend what was happening before the crashing stopped. Tungsto emitted a mental groan. None of his men were left on their legs.

A new line of defenders sprang into place.

"Wrought-iron men, prepare to attack!" came Tungsto's order, and a hundred black-scaled Tungstonians ran forward into line. "Plan B," said Tungsto. "Column of lines. Attack!"

The new lines hurled themselves at the defenders. These had better luck. They seemed to be breaking through, when suddenly Ferro's men unleashed a new tactic. In the first charge they, too, had kept their four arms close in to their bodies. Now they began flailing with these, and Len perceived they were using their fingernails—and not aimlessly. They scratched at the screen grids of Tungsto's men. Immediately strange things began to happen. Some of the attackers fell with tremendous crashes, while others suddenly left the ground and floated off into the sky.

Tungsto groaned.

"They're using their vanadium fingernails to destroy our gravity-balancing mechanism," he explained. "It isn't ethical."

"Why?" asked Len.

"We agreed, long ago, that to preserve the races we would observe certain rules. Of

course a man's gravity-balancing mechanism is his most vital point. It can never be replaced after he reaches maturity. To scratch them away is like—like—"

"Like gouging in the eyes," Fred suggested.

"Yes," answered Tungsto.

NOW the charge was over. A new line of Ferro's men was formed.

"Twenty-carbon steel," came Tungsto's order. "Prepare to attack!"

"Wait a minute," said Len Niles. "We're not getting anywhere. We haven't got a chance."

"But I am going to protest the use of fingernails," said Tungsto.

"What good will that do if they defeat you?"

Tungsto could not answer the question. He did not know.

"I think I'm getting the idea," said Len. "You'll work up through different grades of steel until you get to tool steel, say?"

Tungsto paused to interpret "tool steel." "Yes, that's right."

"And they'll meet you with the same kind each time?"

"Yes."

"The way it looks to me, we are losing because our men are not as strong, or as tough as those of Ferro."

"I'm afraid so. We can only try."

"Is this due to a lack of flintrex?"

"Yes. Flintrex, besides adding certain qualities to metal, also cleanses it of impurities."

Len couldn't help thinking of the compressor-shaft, but he put it out of his mind.

"You have nichrome and manganese and vanadium and beryllium men?"

Tungsto hesitated as he searched Len's mind for the meaning of each element. "Yes," he said. "And many, many more."

"Your idea is to work up to tougher and tougher ones?"

"Yes. That is the only strategy permissible. The final groups will be the nickel-chromium-tungsten-cobalt-molybdenum-tantalum alloys. They are our rulers and their cabinets." Tungsto sighed. "It will take days, perhaps weeks, because the harder metals fight much longer."

"That's the sissiest fighting I ever saw," said Fred.

"Get behind a Venusian cloud!" Len snapped back at him.

Tungsto didn't quite understand these remarks.

"An attack is a tiresome business," he said, "but of course there was nothing else for us to do. And what we must do, we must."

"But why plan it this way?"

"It's tradition," said Tungsto. "It avoids destruction of the entire races."

"Well, the side with the greatest number is almost sure to win," said Fred.

"Yes, of course. And Ferro's men outnumber us."

Len was stunned. "Why, then, did you start the attack?"

Tungsto shrugged his four shoulders. "What else could we do? Stand up and die?"

The low-carbon-steel men went in. They bent when they crashed against Ferro's men, but they didn't suffer as much breakage as the cast-iron men. Yet presently they were defeated.

"It's going badly," said Len.

Avis spoke up. "Our men aren't putting their heart into it. They go forward as if they knew they're going to lose."

"Yes, they know we'll lose," said Tungsto.

A new defense line formed. Tungsto started to give an order.

"Wait!" said Len Niles. "Send in the first manganese group. Order the spring-steel men in reserve for a counter-attack!"

Tungsto turned his screen-grid on Len. "But it's not according to the regular order of alloys."

"Do it!" said Len.

Tungsto hesitated, but obeyed. Three lines of shiny steel men sprang forward.

"What's on the other side?" asked Ken.

"Oil-hardened tool steel," said Tungsto.

"Good. Order the attack."

Tungsto did. The manganese men crashed through the tool-steel men and left them broken and battered. They rushed back to reform.

Len Niles was exultant. "Only three losses for our side," he pointed out. "All screen-grid casualties. Two floated away. One dropped."

"But we can't do this," said Tungsto. "The rules of attack forbid it."

"Asteroids to that!" said Len. "How about fingernails?"

BRISKLY Tungsto ordered in a higher manganese group.

"Wait a minute," said Len. "Your men never tire, do they?"

"No."

"Then use this same bunch again. Save the others until you need them." He was excited now. "What are they meeting us with?"

Tungsto studied the new defense line. "Some cobalt alloy, I would say."

"Good. Your manganese men can take them, too. Wait. Have the second manganese bunch follow up immediately."

"But it isn't ethical."

"Do what I say." Len was emphatic.

Tungsto sighed and ordered the attack. Now the crash of steel against steel began to take on a new sound, a high, vibrating note, as tough steel met tough steel.

"Order them to go right on through to the globe," said Len.

"I can't do that," said Tungsto. "We can't make an attempt to get the flintrex itself unless we win the battle. The globe itself isn't locked, and if we win we can get it easily."

"Asteroids! This business is silly."

"Don't forget that Hart Niles told us in his notes how a few hundred years of tradition bound the world until it was almost destroyed," said Avis. "What do you think a million years would do?"

Len stared down at her. "I get it," he said, "but I'm a newcomer. I'm going to bust a few traditions in a big way."

Before they could reach for him he was gone, running awkwardly in the space-suit, the bucket floating along in one hand. He went straight into the center of the charging line, watching for an opening. Half a dozen manganese men surged hard through, leaving cobalt men on the ground and the gap for which he had been searching. He sprang through the opening and ran straight for the steel globe.

There was no one to stop him. The globe was hardly waist-high, with a foot-wide opening in the top. Strange way, thought Len, to preserve anything as precious as flintrex.

He put his head through the hole. The globe was half filled with a fine brown powder. He hesitated. He had expected to find it in small containers of some kind, and he had figured that in three or four trips he could obtain all that Tungsto's men needed. But the loose powder didn't interfere with his plan. He could scoop up the stuff with his hands.

He pulled his head back out, saw the attack was still going successfully, and thrust the bucket in the hole. It wouldn't go through. He set it on top and put one arm and his head inside. He shoved one gloved hand down into the brown powder and started to bring it up.

But his arm was almost pulled from its socket. His hand seemed to be nailed down. He tried again and groaned from the twist in his shoulder. It was impossible for him to raise his hand a fraction of an inch.

Now he understood why the powder was kept loose in an open globe. It had been permanently gravitized so that it had what would have been its normal weight under the tremendous gravity. One grain must have weighed hundreds of pounds. He would never be able to lift any of it. He uncupped his hand and started back out. Then he groaned again. His shoulder twisted until he thought it must be broken.

He couldn't get his hand out of the globe because some of the powder was clinging in the cracks of the glove.

"It's what I get for interfering."

He managed to raise his head through the hole and get his other arm inside. The attack was over. The manganese men were withdrawing and a new line of defenders was coming from behind the globe. Some of them turned their screen grids toward Len, as if trying to discover what was occurring there.

Len worked desperately, flicking tiny grains of dust from his hand. The weight of the powder explained why they didn't try to get it until the battle was decided.

He could almost lift his arm now. He examined his weighted hand and brushed off a speck of brown dust. He was free. He slid off the globe and started back.

But now two Ferrians were running toward him. They could adapt themselves pretty fast, Len thought grimly. Their vanadium fingernails were flashing. If one of those touched his space-suit he would die.

They were almost on him. He dropped to the ground and rolled toward them. One stumbled over him and fell, with Len squirming desperately to get from under before an iron torso crashed down on him.

He rolled away as the steel legs came to the ground, and sprang to his feet. The second one was waiting for him. It hurled its steel body at him. Len dodged, but the steel brushed him and threw him off balance. He floundered to hold his footing. The Ferrian stopped and started to turn. Len got his balance and dashed across behind him.

But a steel arm caught him across the middle. If he had been standing still, it would have killed him. But he was running in the same direction as the blow. It hit him with a thud and lifted him into the air. In the audio he heard Avis scream.

He came down a dozen feet away, landing on his shoulders. Like lightning he rolled over to his feet, and started to run. This time he wasn't fooling. He charged across the small plain and knifed back through Tungsto's new line.

## CHAPTER XIV

### *Missing Ingredient*

CUTTING away from the battle lines, Len Niles headed straight for the hill where Tungsto and Fred and Avis were standing, without wasting any more time. Len was battered, but he was alive, and his space-suit was still whole.

He looked back at the conflict. Matters didn't look encouraging. Ferro's men were adaptable. They had brought out their beryllium line for defense. They crashed through the vanadium attackers and charged the reserve. There the spring-steel defense line bounced them back with heavy losses.

"How many spring-steel men have you?" asked Len.

"Those are all," Tungsto replied.

Len watched events glumly. A second wave of beryllium men came charging across the battle area. Len groaned. They'd break through now. Too many of them. They started crashing into the spring-steel reserves.

On impulse, Len leaped forward, drew his glass pistol, aimed at the foremost beryllium man and fired at his screen-grid.

There was a startling result.

The glass bullet left the muzzle of his gun, but when it lost physical contact with his body, it dropped quickly—dropped with a crash that showed its tremendous weight, and opened a crack in the tillial. The crack widened swiftly into a chasm that shot through the battlefield. Ferrians and Tungstonians fell into it and crashed far below, out of sight.

Len stumbled back just in time.

"When in the City of Glass," Hart Niles had written, "do as the Glassmen do."

Len was crestfallen. There was nothing for the Tungstonians to do now but retreat. The globe of flintrex was protected by an impassable barrier, for the chasm was fifteen feet wide and its bottom far out of sight.

Tungsto gave the order.

"We'll have to retreat by way of the Activation Area," he explained. "Otherwise Ferro's men will be waiting for us. It isn't ethical, but"—he sighed—"ethics don't seem to govern any more."

His men started back. He kept Len and Avis and Fred with him, and they marched over a long plain in total blackness.

"Everything is flat here," Tungsto told them. "The heavy gravity makes upthrusts of ground impossible. That chasm that opened up when you used your—weapon—will soon be filled with tillial that will break from the edges."

"I see why weapons haven't been used on your planet," said Len.

Tungsto answered slowly. "I always thought it was just tradition."

The planet became not quite so dark. At first it was just a thinning of the atmosphere, then it was like the dawn an hour before sunrise, and finally before them spread an immense area as light as day. The area appeared to be nothing but a flat plain of frozen, pale yellow tillial.

Tungsto walked slowly at first, and presently Len noticed a mask of some sort had dropped over the Iron Man's screen grid. Tungsto answered the question before Len formed it.

"Our perceptive mechanism can't stand the intense light that's characteristic of this area," he said.

His twenty-eight hundred men marched in order behind them, but suddenly, without warning, Len was unable to lift his right foot. His blood turned as cold as the frozen helium on Uranus's fourth moon, but his voice was quite calm as he spoke to Fred and Avis.

"My repellant is gone."

Avis gave a choked cry and ran to his side, and then she, too, uttered a similar distressed cry.

"My left foot! I can't lift it. It's terribly heavy."

Tungsto was watching them. He appeared to be amused.

"It's nothing but a magnetic porlatum," he said. "We can counteract it."

"What do you mean by that?" asked Len. Tungsto's words brought him a feeling of vast relief, but Len was dubious.

"Porlatum is a plant," said Tungsto. "The only one that grows on our planet."

"He means magnetic potato," Fred muttered.

Tungsto's screen grid turned to Fred. "Perhaps. Wait. Yes, I see from your thoughts it is like a potato, a small, oval root. These roots become magnetized from the activity in the area. When you step over a big one, it holds you down as if you had lost your repellant."

"Oh," said Avis, tremendously relieved.

"But how do we get loose?" Len asked. "It won't help any if we have to stand on these potatoes for the rest of eternity."

"Wait," said Tungsto.

HE WALKED ahead, slowly, seeming to feel for something with his three legs. In a moment he stopped and started to dig in the tillial with his three steel fingers. Then he arose and held out a small purple object that resembled a potato. His army had spread out through the field and all were doing the same thing, walking slowly, stopping to dig, and bringing up small objects.

"Here's a negative—potato," Tungsto said. "Lay it beside your foot."

Len did. But his foot didn't get lighter.

"Maybe it won't work on us," he said anxiously.

"I think it will. What you need is a positive potato. You must have stepped on a negative."

He dug again. "Try this."

Len placed it in position and his foot came free. His foot wasn't light, but he was able to pull it loose.

"I'll get another for your—lady," said Tungsto. "Now you'll need another pair. You carry one in each hand. When a foot becomes fast, you lay a potato by it. When you get an opposite by your foot, they counteract each other and you will be able to go on."

Fred was balancing potatoes in his hands. "I see now why there's no fighting in this place," he growled.

"That's right," said Tungsto. "Now you walk around until you feel a slight pull, then you dig. It takes hours, sometimes, to cross a field of potatoes."

"That sounds like what Hart Niles used to tell us about those things he called 'watermelons'," said Fred.

"It must be dangerous to get out here alone," said Len.

"It would be for you because your gravity repellant is limited," said Tungsto. "For us, it doesn't matter. We have eternity to wait, anyway. But we seldom come into the Area unless in groups of three or four."

Tungsto's men had spread out over a large space. They were advancing, occasionally stopping suddenly, changing potatoes from one hand to the next, then digging for another. It was slow.

"What a wonderful trap for an attacking army," thought Ken.

"This district is heavily loaded with—with—wait—actinium," said Tungsto.

"Actinium!" Len exclaimed. "That's even rarer than radium, on Earth."

Tungsto considered. "Yes, it probably is. There are a number of forms. It is slightly radioactive and nearly always is found in conjunction with uranium or radium. This particular form—actinium Six, we call it—is shortlived. But in the presence of uranium, its life is multiplied considerably. Also, with uranium present as a catalyst, it acts on nebulium and causes it to become a powerful repellant, with many times its original force of gravitation. Nebulium, by the way, is a multiple-ionized form of your element thorium. We Iron Men are equipped with osmium screens to control the repellant action."

"Oh," said Len. "Is that the way you control the planets movements, too?"

Tungsto nodded his steel head. "With our machinery and large amounts of negated nebulium we can actually cause the planet to repel instead of attract."

Avis cried, "That's it. That's why Halley's comet performs so strangely."

Tungsto caught her tumbling thought. "Yes, comets are composed largely of redullial, an extremely light element not far above tillial, which is particularly responsive to nebulium."

"That explains Simon's repellant, too," Len said, excited. "He isolated a small amount of actino-uranium, and there was enough nebulium in it to provide the repelling force. It was the combination of all three elements which did the work. Simon would give his life to know that."

Tungsto stooped and with his back arm picked up a small piece of rock. "Here is a piece of actino-uranium in a frozen hydrogen matrix."

Len took it. "I want to save this for analysis," he said. "Is there plenty?"

"Oh, yes. This Area covers several thousand of your square miles."

"And I'm tired already," Fred groaned.

"Oh, we're cutting across a small tongue. When we get through, we'll be at the edge of our city."

Listen, Tungsto," said Len. "You have plenty of stuff to work with. Why don't you still control the planet's movements and keep it away from the galaxy? You're going to tear up the whole cosmic system." One foot was nailed down. He stopped to lay a potato by it and then, when his foot was free, looked for another.

SLOWLY Tungsto shook his head. "I know," he said wearily. "But some day we'll all die, anyway, and then who will do the work? It takes thousands of years' training for this work." He made a peculiar movement, indicating a sad smile. "One doesn't control the movements of a planet

by reading instructions from a book, you know. It's a delicate process. It took our greatest mathematical board three hundred years to calculate the formulae for keeping the planet at the proper distance from your Solarsystem without becoming lost in the Voids."

"Oh." Len groaned and took a deep breath of oxygen. "Then, even if you wanted to, you couldn't move the planet for a long time."

"Oh, yes. We could start it. Our trained machinery men could guess at the amount of power necessary. Then we could stop the reaction later and calculate the final formulae. It would of course take us thousands of years to reach the Edge."

"Then there's hope—"

Len Niles ducked. He almost fell down.

Something had scurried across in front of him and, directly before him, shot into the air. He was staring upward when the thing exploded thirty feet above him. The pieces seemed to lose part of their repellant properties as they dropped, and fell with tremendous thuds. A titanium-tantalum man directly behind them was struck by one of the pieces and split in two. He fell to the ground, with mercury crashing from his veins.

"Those little animals are dangerous," said Tungsto. "The pieces don't often hit us, but when they do, it's always fatal." He shrugged his four shoulders.

By this time, apparently, they had left the potato field.

Len watched for the sleek little animals that scurried ahead of them.

"Your ship landed near the edge of the Area," said Tungsto. "That's why you could see."

"We are getting lighter," Avis observed.

Len looked down at her.

"You're right," he exclaimed. "Say, I think I begin to see how we can get away."

"Maybe we can persuade Tungsto to help us," Avis suggested.

"Yes," said Len. "If we can get the stuff to move the ship, we'd be all right." But he shook his head slowly. "But what good will it do us to leave? Here is where the trouble is. Here's where we have to fight it out."

They came out, finally, in Tungsto's diagonal iron streets. They had felt light of weight in the Area, but as they marched toward the square, Len suddenly realized his legs were very heavy. He glanced at the dials on his chest.

"Our repellant," he said shortly, "is playing out. We've got to get back to the ship —fast."

Tungsto went with them. "I feel as if I had known you a long time," he said. "You are my friend, although you are made of strange materials. Otherwise you are just like us."

Avis looked at him, stunned. Len broke in quickly on the audio.

"Don't think, Avis. They can't actually see. Their screen-grids perceive materials and general forms, but they depend on other senses and on experience to tell a Tungstonian from a Ferrian, for instance."

Tungsto had paused, apparently trying to catch their thoughts, but now he went on. "I will bring you some activated nebulium from our underground stores, so you won't run the risk of being crushed."

But their bodies were getting very heavy. They made progress more and more slowly. Lines of weariness began to show in their faces. Fred's cheeks were gray with exhaustion.

"Can't go much farther," he grunted.

"We're almost there," said Len. He took hold of Fred's arm, and Avis', too, but he himself could hardly travel. It was like lifting his legs with tremendous weights attached.

Then the ship came in sight. They helped Avis into the lock, and Len helped Fred. Then Len got his arms in and fell flat on his stomach. From there he couldn't move. His legs were like solid cement cornerstones. But Tungsto came up, gave him a push, and Len crawled inside. He asked Tungsto in, but the Iron Man said he had to return.

In there it was lighter, and Len Niles at once went to the ship's controls. When he turned back his face was white. "The repellant we left in the ship is losing power, too," he said grimly. "We have only a few hours to live." He put on his helmet and switched on the thought-transmitter. He thought as hard as he ever had in his life, but there was no answering thought from Tungsto. Len put the helmet down.

"I've got to find Tungsto," he declared. "That's the only hope we have."

AVIS and Fred protested, but Len wearily put on his suit and got into the air-lock. He opened the outer door and put one foot through. It dropped like an iron compressor-shaft in water. He knew then it was impossible. If he got through that door, he would crumple on the ground, and eventually spread out over G's surface in a thin layer of—well, nothing pleasant.

He tried to pull his foot back in, but he couldn't. Suddenly there was help. Fred was there, tugging at him. Together they got his foot inside. Defeated, Len took off his suit.

"That's all there is, I guess. There isn't any more. Tungsto will never get back in time. I'm sure of that. Time doesn't mean much to him."

He put away his suit. "Well, anyway, let's try to keep busy. Where's the spectroscope?"

He found it, put the small piece of actinouranium in a Geissler tube. He adjusted dials, shot a spark through the tube; he used varying excitation potentials and different sparks, with the automatic camera recording each spectrum. Avis was quiet, watching him. Fred was slumped in his iron chair.

Len pulled out the photos and laid them one by one on the comparator. Presently he spoke, puzzled.

"There's some impurity here. I see the characteristic line of hydrogen at six-five-six-two point seven-nine Angstroms. In it is uranium"—he spoke slowly, and consulted a reference book. "We have no data on actinium." He laid another photo on the scale. "There are some strange lines, and yet they seem familiar, as if I'd seen them often. A line of first intensity at three-nine-oh-five point five-two-eight Angstroms."

"Probably one of these fancy elements we never heard of," Fred muttered in wry displeasure.

But Len was consulting the tables. "Three, nine, oh, five, point, five two eight —hey, wait up for just a minute! That's silicon!"

"Silicon?" said Avis. "Where did it come from?"

Len looked blank. "It couldn't possibly be right."

Then Fred, in spite of his weariness and his weight, jumped.

"I know! I know where you got it! You remember—a fine brown powder! They give it to the Glassmen in their rations!"

"Yes, but I still don't understand."

"A fine brown powder!" urged Fred. His eyes were big with excitement.

Len's mouth opened slowly. "Sure! As sure as comets and gravitation! The globe! The fine brown powder! Flintrex!" he shouted.

"You had a trace left on your hands," said Fred.

Len jumped up. He was jubilant. "That's it! Silicon! The Iron Men need silicon!"

## CHAPTER XV

### *Unexpected Aid*

A WAVE of hope, such as he had not known for many days, leaped in Len Niles' breast. It filled him with a sense of exultation and delight.

"Of course!" Len shouted excitedly. "The thought-word was flintrex. Silicon comes from the pre-historic Latin silex, meaning flint. That's all Tungsto could get from our thoughts. The Earth has more silicon than anything else but oxygen. Just as Planet G has most of the nebulium in the universe, we've got most of the silicon! The Earth is the universe's storehouse of silicon. Silicon! Get that? Sand? Sand by the billions of tons!"

"But we're not on Earth," said Fred soberly. "It would take time to transport sand."

"There's a hammering at the air-lock!" said Avis. "It must be Tungsto."

Len quickly donned a helmet for communication purposes and opened the outer door of the air-lock. Then Tungsto was inside, braced on his three legs, his four arms each carrying a heavy container.

"I've brought you four hundred pounds," he said. "That would be enough to move your planet earth anywhere you want to. But of course you won't want to go back. In another two weeks it will have completely escaped from the sun."

"We could move it back," thought Len quickly.

Tungsto shook his metallic head. "None of your people will be alive by that time. Here. I've brought a small osmium screen. It's big enough to do anything you will need to do."

"Fine. I—what's the matter."

Tungsto had turned suddenly. His screen grid was toward the city.

"Ferro's men are coming for a counter-attack," he said. "It isn't ethical, since we didn't win, but they never fight fair." His four shoulders shrugged expressively. He started for the lock. "I'll have to hurry back and organize a defense. This probably will be the last of us," he thought resignedly.

Len stared at him. "No! I'll stop the attack," he suddenly shouted. "I know how!"

"You can't use the repellant," Tungsto said. "They will have protectors."

"I hadn't even thought of that. Something better—and I think it will work! Go

ahead and organize. I'll be there in a few minutes."

Hurriedly he distributed a small amount of the vital actino-uranium in the ship's controls and in the three suits.

"Come on," he said to his companions. "We're going to try something."

He went to the back of the ship.

They reached the edge of the city just ahead of the Ferrians and met Tungsto, gloomily waiting for the attack, his chrome-manganese men drawn up in the first wave.

Len chuckled. "At least there's been one change in tactics since we got here." He pointed to the spring-steel reserves in Tungsto's formation.

The three-legged army approached. At a command from their leader, they stopped. An attacking rank began to form. Len watched the shiny steel leader until the charge was about ready to start. Then he sent out a thought.

"Hold on a minute! I want to talk to you."

Ferro's answer was slow. He was analyzing the peculiar thought of this strange person.

Len walked forward slowly, and he was careful to think only friendly thoughts—how he could supply something that both factions of Iron Men needed, how he wanted to help them both. In fact, a fleeting thought occurred to him that he was laying it on a little thick, but he instantly suppressed that one.

"What do you want?" asked Ferro. He stalked ahead a short distance and waited, his screen grid turned straight to Len. His four arms down but his manner showed he was on the alert. Len realized Ferro wasn't going to be caught in a trap.

"There need be no war between you and Tungsto," Len told him. "The only difference between your people and his people is the control of flintrex."

"And there is little of that," Ferro flung back. "Tungsto needn't think he can take it from us. In a few million years his men will be extinct, and ours will rule the planet."

"Tungsto's people have given up hope," answered Len. "Remember, Ferro, they are not operating the machinery to control the planet's movements. They alone know how to manage that machinery, and if it is neglected, your planet will be destroyed. You must know it is a runaway body now."

NO ANSWERING thought came from Ferro.

"I can provide silicon—flintrex—for both of you," Len went on. "Enough for a long time. Enough to keep you a strong, virile race."

"We have—silicon," said Ferro.

"But not much," Len argued. "I can give you many times that amount." He calculated. "Say thirty times what you have now."

Ferro's arms twitched. He would, Len knew, like to get his hands on that much silicon. Finally Ferro thought, "How can you prove this?"

Len held out his cupped hand and walked slowly closer. "I have here a small amount of silicon dioxide. I can provide much more—thirty times what you have now—six thousand pounds."

If Ferro had had eyes they would have bulged. His head shot forward and a tiny, brief flash of light came from his screen grid.

Len moved closer, cautiously.

"Take this," he said. "Examine it."

Ferro hesitated. His thoughts were a confused mixture of suspicion and desire. Finally he held out his shiny front arm, the three steel fingers cupped. Len poured the silicon dioxide into his hand.

Ferro turned his screen grid toward it. Some adjustment seemed to be going on inside his head.

"He is using a spectroscopic lens," came Tungsto's thought.

Presently Ferro straightened up. His back arm motioned and one of his men came forward, a polished titanium man. The titanium man took the substance and examined it. Presently he also nodded his steel head.

"The stranger is true," came his excited thought. "This is indeed silicon dioxide. Six thousand—pounds—of this would last a long time."

"All right," thought Len, pressing the bargain, "Will you agree to leave the Tungstonians alone if I provide this amount?"

Ferro called more of his men together. Thoughts flashed among them with the speed of gravity, and then Ferro turned.

"On condition there is no trick," he said. "When can you deliver this material?"

Len caught a thought from Fred. It was hardly a definite thought, but an impression that said as plainly as words, "Now we're sunk."

But Len's voice rang out.

"Now! Whenever you bring containers."

In his exuberance he had forgotten and said it aloud, but Ferro got the thought. He hesitated and then flashed a command

back to his army for a container.

In a moment a big sheet-iron container floated through the air. Obviously, thought Len, it was equipped with a gravity-balancer. It settled down before him.

"What guarantee will you give?" asked Len.

"His word is good," came Tungsto's thought from behind.

"To the ship, then," said Len.

Then came a cry of relief from Avis, somewhere behind him. "Silicon dioxide!" she said. "Sand!"

Fred was voiceless for a moment. "Oh, sure!" he said. "Sand! Ballast!"

Within half an hour they had loaded three tons of their sand ballast into the tub through the escape hatches in the ballast compartments. Each time sand flowed into the tub it started to settle, but a Ferrian from his seat on top made an adjustment and the tub rose again.

Ferro watched every grain of sand. He kept his spectroscopic lens turned on the flowing stream. Finally he was satisfied.

"You have done much for us," he said warmly.

The tub floated off, and Ferro ordered his men to return to Hematite. His four arms saluted Len Niles. Then he strode away.

Then Len realized how gloomy Tungsto's thoughts had become.

"You've helped Ferro, but what of us?" he asked.

Len beamed at him. "Don't worry, my friend. There is more. I have saved ten thousand pounds for you."

"Oh!" Tungsto's manner grew cheerful. "Can we—shall I—?"

"Bring your containers," Len said. "But there are two favors I would like to ask." He stopped and caught his breath. "Will you move your planet, and can you let us have more nebulium?"

"It will be moved," said Tungsto promptly. "And you may have all the nebulium you want. I will order the containers to be brought filled with it—with actino-uranium to negate it and osmium to control the reaction."

IN ANOTHER two hours their ballast compartments were loaded with nebulium—most of which Tungsto had had neutralized—actino-uranium, and osmium.

"In the osmium screen I gave you," Tungsto said, "is enough nebulium to raise your ship."

"And you won't forget," Len reminded him, anxiously. "Can you—will you move your planet at once, as I have asked?"

"I have ordered our men to work," said Tungsto. "Your Earth is now one hundred thirty-five million miles from the Sun, almost in the former orbit of Mars, and I am afraid it will be very cold out there. But we are putting all our machinery into action as a repellant, and our planet will pull the Earth no longer. However," he thought soberly, "it is possible that your Earth has acquired enough speed completely to escape the Sun. For that I have the deepest regret, but there is nothing we can do now."

"But if it is so far out, the Earth will freeze," said Avis faintly.

Tungsto's thoughts were rapid. "Eventually you will learn how to move the Earth, but that will take generations. In the meantime, you will have to do many things to protect yourself, but I have here a hand-thinker. It speaks in thoughts, and describes our machinery. With it you will have unlimited power from nebulium." He considered. "You could even pull a great amount of heat from the Sun to warm parts of your planet."

"Oh," said Len, brightening. "That's all we need. The Earth is uninhabited except in one small spot."

"Then if you use your nebulium carefully, its life is infinite. The actino-uranium is short-lived. It lasts perhaps ten thousand years."

"But we can produce more from the Earth itself," said Len.

Tungsto nodded his steel head. "I think so. Here also is a hand-thinker on iron and steel. From your thoughts, I have seen that you need this. Just ask it questions and it will answer them." What he handed over was a tiny steel box that fitted in the cup of Len's palm.

"Well, my friends," said Tungsto, "good-by, as you say, and good luck as I hear you thinking."

Len reached out his hand impulsively. Tungsto hesitated as he searched for the thought and then he reached, too. His three steel fingers closed around Len's palm.

Len shrieked. Instantly Tungsto loosened his grip. Len wrung his hand, but he grinned.

"Good-by—and tell all the little Iron Boys and Girls hello for Uncle Len, when they are born."

"That I will do," said Tungsto gravely.

They entered the air-lock one by one, got inside and took off their suits. They looked at one another. Len grinned, Avis smiled, and even Fred's face was bright.

Len felt in his pockets. "Have a hydropone," he said to Fred. "Wait!" He held up his hand. "A slight wager."

"Asteroids!" growled Fred.

"One to five hundred," said Len. "You're bound to win sometime. If you win, you will get rid of five hundred sandoes."

Fred scowled. "Okay," he said. "Let me do it this time."

He took the package and held it close to his face, examining it. He pressed the button. A hydropone popped up, smouldered a moment—and went out.

Len stared. "Wait! What happened?"

Fred brought nitrate disks from his locker.

"Twenty-five," he counted. "Thanks, Len."

They went to work at the controls. Presently the activator hummed. Len set the controls gingerly with the new surplus of power in the repellant tubes. Suddenly the ship shot straight up.

"Oops!" said Len, getting off the floor. "Too much that time."

He set the course for the solar system and turned on the power of the atomic motor.

"No acceleration," he said. "That is, you can't feel any. I'm using the nebulium tubes to counteract it. Boy, will we make a run for home!"

HE WATCHED the ether-speed indicator.

"Outside of Planet G, we've got in this ship the most terrific concentration of power in the universe," he said. "But if we control it, we'll sure cover space."

Avis was figuring. "The Iron Men won't bother us for another one hundred sixty million years," she announced.

"What'll we do then?" asked Fred.

"That's a long time," Len pointed out. "Let's let the younger generation worry about it." He reached for a lever. "Hang onto your seats. I'm turning on full power."

He shoved the lever over. There was a slight lurch. Len watched the speed indicator and his eyes went wide. "That dial's no good any more. We must have several times the speed of light already. It's just a guess, but I'd say we could approach the speed of gravitation if we packed enough nebulium in the tubes."

He sat down and propped up his feet. "I'm going to do some surgical work on that toenail when we get home," he said.

"Do you realize from what Tungsto said, we've been gone five weeks?" asked Fred suddenly.

## CHAPTER XVI

### *Marked Man*

NOTWITHSTANDING the fact they had no way of telling how much actual time was used on the way, it seemed only a few minutes before the Earth was a great tan-colored ball in their viewing-sphere. Len Niles sent the ship lower and cut the speed until they were floating but a few miles above the surface.

Avis and Fred watched the viewing-sphere, appalled at the difference in Earth. There had been upheavals and in some places new mountain ranges had been born. In others deep canyons had rent the crust—canyons which made them shudder. But worst of all was the ice.

The north third and south thirds of the oceans were solidly covered with ice. Large areas of land were sheathed in white. The coal mines that had been on the eastern coast of America were now far under water and the ice over them appeared to be half a mile thick.

"We'd never get down there for fuel," said Fred glumly.

They found the City of Glass, a tiny black dome, half hidden in the twilight, for the Sun's rays here were feeble and, though the sky was clear and the Sun at its zenith, it was like eternal dusk.

They floated high until the Sun had gone down and the black night had settled over the great desert. Off in the north a dull phosphorescence from the ice-fields glowed and flickered.

After dark, Len floated the ship down quietly and landed a quarter of a mile from the Entrance.

"There are still lights," whispered Avis hopefully.

"Yes," said Len.

They opened the air-lock and were hit by a blast of frigid wind. Their short glass clothing didn't protect them very much. They held a grim consultation and started for the mouth of the air-tube.

Then Len heard a shout. Out of the tube came Simon, Len's mother and Philip. They hurried across the sand toward the returned voyagers.

Simon shook hands with Len and Fred and embraced his daughter. Len's mother spoke severely to him. "Come on in. You'll get cold out here."

"All of us who were underground are

staying in the observatory," Simon explained. "The rest of the Nilesmen have barricaded themselves in the Inorganic Laboratory, and the Glassmen can't decide what to do. There was a big investigation when the ship took off. One of the guards at the Entrance saw it."

"How long have we been gone?" Len asked anxiously, walking between his mother and the wind. They were all shivering violently.

"About five weeks," said Simon tonelessly. "I suppose you couldn't land anywhere. Well, you haven't come back to much. The Earth as we knew it is gone forever, and we have no power, no heat. We're all doomed. I had hoped you three would escape, but, anyway, we're glad to see you."

Len Niles couldn't help smiling. Avis spoke excitedly. "But Father, we did land!"

Simon stared toward her.

"We landed on Planet G," she insisted.

"You couldn't possibly have got away afterward," Simon said slowly, hoping to hear the proof that they had.

Len pressed his arm. "We did," he assured. "I'll tell you all about it later."

They crowded into the small laboratory. Simon seemed to be in a daze. The laboratory was built entirely underground and so it wasn't quite as cold as Len had expected.

That night Len talked with Simon and said just enough to prove to the old scientist that they had indeed landed on Planet G. Then he asked the question that had been burning in his brain.

"What of our orbit?"

Simon took a deep breath. "I can't tell yet. The outer planets—Mars, Jupiter, Saturn, Uranus, Neptune—have all definitely left the system, but as for Earth—" He shook his head. "We are almost at the critical point—the speed of escape from the Sun," he said wearily.

"But not quite?" asked Len.

"Not quite," said Simon. "That is, I think not. It will take another twenty-four hours to determine."

Len drew a deep breath and began to talk. Even Simon, with his tremendous mind, could hardly believe the things Len Niles told him, but when he saw a tiny sample of nebulium, and odd, gray-green powder, and saw Len demonstrate it, he was thoroughly convinced.

Len made a trip to the ship. He lifted it and put it down a hundred yards in front of the Entrance, set the gravity-pull at a low rate, took a supply of nebulium, osmium, and actino-uranium with him, and went back to the observatory with the substances.

"We'll make some gravity-control units," he said.

"We haven't any equipment," Philip observed.

"We don't need much. I have the elements here. They're simple. Crude, maybe, but they will work. Watch."

By morning some individual repellant units were ready, with amusing results. When Philip tried his, he was promptly smashed to the floor. Len ran to him and changed the control, and helped him up. Philip rubbed his torso.

"I feel all bruised and beaten up," he said.

A shriek came from Avis, and Len turned in time to see Gus Niles, one of the chemistry workers, float up to the top of the observatory and stick there with his head against the ceiling and his body wobbling around like a toy. He found the controls and floated down.

"Let's get some sleep," said Len. "Wake me about sundown."

At sundown he got up and he and Simon and Fred went outside. And then, in spite of the cold, Fred laughed.

Around the ship, clustered like glass-flies on a hydroponic orange, were two hundred Glassmen, shivering, struggling to get away. One pushed himself away from the ship, bent far over and took a few steps in the sand. He almost succeeded in escaping, but suddenly he straightened up like a whip and was snapped back against the side of "The Nilesman."

"I set it for a pull," Len explained. "Use your gravity-repellers and we'll look them over."

THE Glassmen were angry, but they were silent, too, as the three men walked around them.

"You see they can, if they try hard enough, walk a little way," said Len. "But the pull inevitably brings them back. There's no escape."

They finished the circuit of the ship.

"What do you plan now?" asked Simon.

"Nothing—yet." Len looked around. "There isn't much wind tonight. I think we'll let them spend a night on the desert. They'll make good bait. Kardox isn't here yet."

By morning there were eight hundred Glassmen stuck to the ship. They were tightly packed, and among them was Kardox, his lean, angular face gray-green in the pale light.

Len got behind him and helped him away. They went to the observatory, and Len sent

back for Murco and Darum and Aldo. Aldo was still in the City, but he came, avoiding the ship.

"Now will you call a meeting of the Regulating Body?" said Len to Kardox.

"I have no choice," said Kardox raspingly. He cleared his throat.

"I proclaim an extraordinary session of the Regulating Body," he said in his crackling voice. "Regulator Aldo, will you keep the record?"

"I will," said the yellow-tunicked Aldo, watching Len Niles.

Len stood up and bowed slightly to Kardox. His tallness, his light hair, and his bronze skin made him a commanding figure.

"I defer to you," he said, "as Number One. I have a report to make and some suggestions. Three of us have just returned from a visit to another planet and you have seen a very slight demonstration of the power we acquired on that trip."

Simon was grimly taking photographic plates from his big telescope.

"We Nilesmen want to live with and cooperate with the Glassmen," Len went on. "We wish no harm to you—but we want to be free. We want the opportunity to work as much as we desire, to have books, to carry on problems, to progress!"

He continued to address the Council until Simon came back from the developing room.

Len looked anxiously at him.

"I have examined the plates," said Simon, "as well as I can. I believe the Earth has resumed an orbit around the Sun. We are far out, but apparently"—he drew a deep breath—"apparently we are no longer pursuing a tangential course."

"Thank the stars!" breathed Aldo.

Kardox bowed his head.

"Perhaps we have been unduly harsh, but now this terrible cold is a peril to us all, "he said to Len. "We had best work together. I, speaking for myself, am willing to accede to any reasonable demand. But"—he looked up wearily—"we face many problems. First, we must have heat or we shall all perish."

"I can provide that," Len said firmly. "We have the means of acquiring unlimited fuel. And we can make iron and steel such as never were seen on Earth, using silicon as a cleanser, and many alloys for different qualities. It is possible, even, that iron, as a substitute for glass, will come to operate almost for infinity. But there is one other item—we want the odds to be changed on the races and in the Black Dome so we can lose."

Kardox' face drew into the rustling diagonal lines of a smile.

"It seems," he said "that if our entire economy is to be upset by conditions not in our control, your request is a small one. I am willing." He looked around at the green faces of the Regulators. They nodded, one by one. Kardox turned back to Len. "There is," he said slowly, "one point. Have you any plan for converting the Glassmen back to a carbon economy? We would like to be normal—white of skin."

Len faced him squarely. "With unlimited power and with dependable machinery, I am happy to announce that we can safely rely on the fixation of nitrogen—and so there is no longer an obstacle to the conversion."

Kardox arose and smiled broadly. He looked at the Regulators.

"I have always believed Regulator Len to be sincere. I see by your faces that you believe that, too. What is your answer?"

The Regulators all got up. Aldo was beaming.

"I vote to give Regulator Len a free hand," said ancient Darum, in his crackling voice. "He has saved the City, he has saved the race. He has saved—the Earth." He sat down.

"Regulator Len," Kardox and Darum had called him. Len felt happy as he never had before.

ALL voted yes. "Then you may count on our cooperation, Regulator Len," said Kardox, seeming well satisfied. "If you can do only a part of the things you have promised, you will certainly deserve all we can give you."

"I can," Len Niles answered, his voice firm with conviction. . . .

And so, that night, Len Niles, Fred, and Avis walked through the radial streets of the silent City of Glass, with its softly tinted domes, its swishing magnetic cars. Avis' pink shoe-heels twinkled as she walked.

Already Simon was Below in his laboratory, now legalized, with a thought-transmitter on his head, studying the hand-thinker and designing machinery to heat the City against the coming Age of Ice.

They went to the Black Dome, rode to the Curved Light Room, and drank Sizzling Comets, with little fountains of yellow, red, and orange light bursting against their noses. Everywhere people were moving, talking, laughing.

Glassmen, Pales and Nilesmen talked and drank together. It was a new day for the City of Glass.

Len, with one arm around Avis, produced the hydropones.

"Fred, one to a thousand, this time," he said.

He held out the package. A golden-skinned Glasswoman came by unsteadily with a companion.

Fred looked at Len. "I'll take it," he said. Len pressed the button. A hydropone popped out and burned steadily.

"Thanks," said Len. "Here's your sando."

"Don't mention it," said Fred. "Now I'll give you a chance to get even. I'll bet you one to five hundred it won't light."

LEN stared at him. "That's a crazy way to bet, but I'll take it."

Fred pressed the button. It lighted, but Fred didn't seem disturbed.

Cheerfully Len paid him twenty-five nitrate disks.

"I'll let you in on a secret," said Fred. "I learned something from Father. He blows on the hydropone and the carbon dioxide in the breath puts it out."

Len stared again. "Asteroids!" he said.

Fred put the nitrate disks carefully in his pocket, and smiled innocently.

"Have you by chance forgotten," he asked, "that money is going to be spendable from now on?"

Len's eyes opened wide and he groaned aloud.

"Life is getting too uncertain," he said.

Avis looked up at him, her brown eyes shining. "For a man who has just traveled the galaxy, and who is the most famous man in all the universe, you're a little absent-minded, aren't you, dear?"

Len's arm tightened around her slim waist. He looked down at her and grinned.

"I've proved one thing," he said. "The future of the individual members of a race is more important than the future of the race itself."

The golden-skinned Glasswoman had turned and was watching Len intently.

"That is the man who lost eight hundred sandoes the other night!" she said to her companion in an admiring whisper.

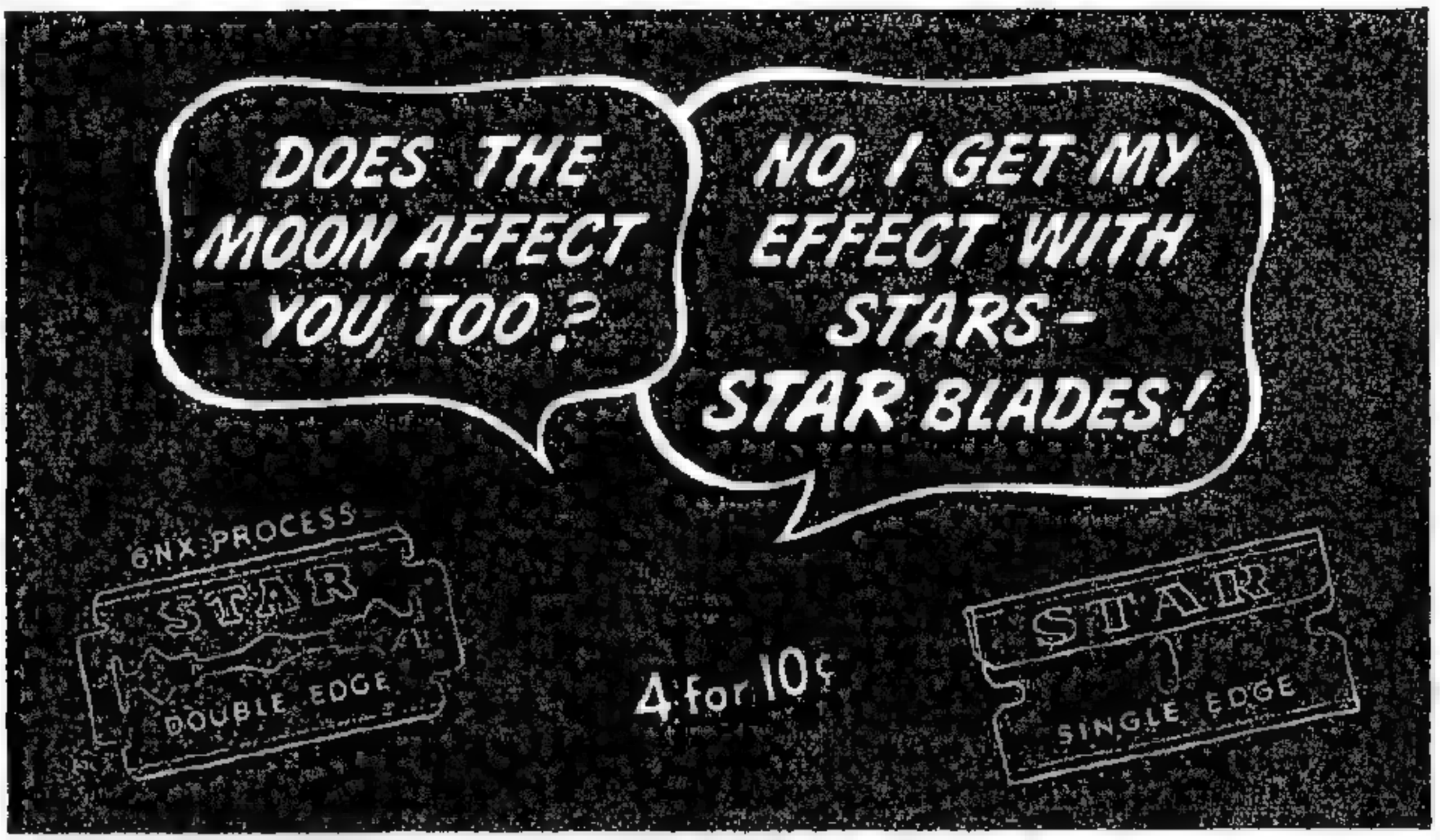
COMING IN THE NEXT ISSUE

# RED SUN OF DANGER

*An Astonishing Complete Captain Future Novel*

By

BRETT STERLING



# DARK COMMAND

By
FRANK BELKNAP
LONG

*Patrol Commander Greg Temple Flings a Challenge at Witchcraft and the Evil Eye!*

Temple knew her name and whispered it softly—"LILITH!"

GREG TEMPLE, Martin Patrol Commander, surveyed his lieutenant with a cold, incredulous glance.

"The Evil Eye!" he cried scornfully. "No, it's ridiculous!"

Then he relaxed in the chair, tapping his desk, his gaunt features twitching in the rays from the ceiling, which was studded with lights. He was a tall wiry man, in his late thirties. A dusting of gray at his temples gave him a curious,

almost ageless look.

"You've got to believe it, sir," said Lieutenant John Rickaby. The young space officer stood facing his superior on the swaying deck of the charthouse. A thin ribbon of blood was trickling down his chin.

Temple wiped his forehead with the inside of his sleeve.

"Well, Mister," he grunted. "Get yourself cleaned up, and we'll see."

Rickaby had turned pale.

"I'm afraid you don't understand, sir," he protested. "You've struck up friendships with a lot of Martians who haven't knifed you in the back. But now it looks as though your luck is wearing thin. I tell you, that tentacled evil devil wouldn't let us come ashore."

"Then go on and spill it," cried Temple as Rickaby shuddered and averted his gaze. "Let me have the rest."

"An old Martian stood on the wharf staring at us, sir," Rickaby said. "One by one my crew knelt down. Before I pushed off our men were groveling in the boat."

Temple's gaze was inscrutable. "You say there were two hundred Martians on the wharf, lieutenant?"

Rickaby nodded. "Yes, but they made no attempt to interfere. In fact, sir, I—I had a feeling they were egging the ringleader on. The next instant that creature wobbled up to the pinnace, and slapped me in the face. I grabbed the controls and came back to the cruiser. That slap was hard to take, sir."

Temple nodded.

"Sure it was," he said. "If you'd knocked Fuzzy Brow seven ways to Christmas I'd have backed you up. But you know how Martians are. Would you rather have had it weeping on your shoulder?"

As Temple's short, harsh laugh sounded in the charthouse, Rickaby saluted, and withdrew.

WHEN Temple found himself alone, he shuddered. Martians were known to possess certain hidden powers. But Temple believed they seemed terrifying to Earthlings only because man fears the unknown. Only to men and women, easily thrown off balance by auto-suggestion, was there any danger.

His lips grew stubborn. Arising from his desk, he buckled on his rayomatic and strode out of the charthouse. In the administration cuddy two micro-typists, Woman's Auxiliary Patrol, stared at him scornfully. Evidently his reputation for forbearance had penetrated the WAP ranks too.

Temple swore softly and turned his steps in the direction of the radio room.

In some respects Martians were like sensitive children—moody, secretive and given to outbursts of irrational rage. And even if one admitted that their hidden powers, to say that they could bewitch people was sheer tommyrot. The Evil Eye—faugh! Black magic? Sheer nonsense!

Grimly Temple promised himself there would be no bloodshed until he was sure, even if it meant losing his command and the respect of every man and woman in the colony. He just couldn't picture himself shooting down on those child-like Martians.

Neither could he picture himself making war on his old friend, Lig Narun. Striding into the radio room Temple crossed to the visual sending apparatus. He dismissed the operator with a curt nod, sat down, and thumbed through a lead-backed code-book until he came to the emergency call number of the oldest and wisest ruler on the ruddy planet.

It was Temple's conviction that Lig Narun would keep nothing back. If there was some sinister conspiracy afoot, Lig Narun would know how to deal with it. For ten years Lig Narun had worked in the closest cooperation with Earthlings. More important, he admired and respected Temple and had never broken his pledged word.

But though Temple had no misgivings, the instant the old Martian's pea-green face appeared on the visual reception disk, he knew that something was wrong.

"Ah, Temple, my friend, it is good to see you," Lig Narun said in a tone which chilled Temple. Lig Narun did not seem cordial. His facial muscles twitched

and his eyes bulged, and then receded into their cavernous sockets. Like all Martians he was not handsome. The yellow fluff of hair on his brow made him resemble an embryonic chicken.

"It's good to see you, Lig Narun," Temple answered.

"Temple, you look worried," came from the disk. The tone implied Lig Narun wanted to terminate the interview.

"I'm worried, all right," Temple admitted. "An hour ago when one of my lieutenants tried to go ashore, he was stopped at the wharf by a Martian. It's ridiculous, of course, but there has been talk of sorcery, hauntings, and even some gossip about the Evil Eye."

Lig Narun looked stunned. There was a moment of silence. Then the Martian spoke in tones of astonishment.

"You mean we are thought to possess supernatural powers?"

"Not necessarily supernatural," Temple answered. "We Earthlings don't believe in such things any more. But our caveman ancestors used to look beyond the firelight and imagine the darkness was filled with all manner of evil shapes — demons, warlocks, vampires, ghouls. And some Earthlings haven't lost their caveman fears."

"I don't follow you, Temple."

"Well, we dread the unknown. And to a few of us, Mars is like the darkness beyond the firelight, Lig Narun."

"But it is not an unexplored wilderness," the Martian demurred. "You've colonized two-thirds of the planet."

"That's why we don't want such legends to grow," said Temple. "Superstition springs from a dark subsoil deep within our minds. We must prune it and keep it puny."

TEMPLE paused. He felt that he had to phrase what he was about to say carefully. He didn't want it to sound like a threat.

"I don't know what really happened on the wharf, Lig Narun. Perhaps my lieutenant was overwrought. But surely you must realize the incident was unfortunate."

Lig Narun returned Temple's stare.

"Temple, I'll look into it," he said. "You have my promise."

There was nothing more Temple wanted to say. Frowning he watched Lig Narun's image recede in a nebulous glimmering. The Commander's uneasiness had increased tenfold. The Martian's manner implied he meant to "look into it" all right, but that the affair was proceeding in a satisfactory fashion.

When Temple emerged on the deck of the Patrol cruiser, his fists were clenched and he carried himself with a fatalistic air. The cruiser was swinging at anchor close to the west bank of the short Point Barter Canal, which twisted like a water-moccasin in and out over the bleak Martian landscape.

Though the gleaming lights of the distant Alpha Colony were visible, they only emphasized an impression of all-engulfing desolation. Even the sky seemed to scowl menacingly as the Patrol officer went ashore in a ship's boat over the darkly swirling tides and sprang to one of the spray-lashed jetties with one swift leap.

He paused only long enough to straighten his service cap, and pack some fresh tobacco in his pipe. As he tamped the tobacco down, the blue and yellow lights of a canalside tavern drifted out over his tall, stationary bulk, giving him something of the aspect of an avenging Nemesis. Yet as he strode toward the tavern, there was in him only bitter despair. His dream of Colonial Office amity had been shattered overnight.

Shattered overnight. Temple started, and swung about. From behind him had come the ominous, unmistakable droning of a Martian observation dirigible balloon approaching the wharf from somewhere overhead.

He stood still, gnawing at his underlip, and searched the pall which obscured the distant outlines of the patrol cruiser in the canal.

He had no way of knowing the course of the balloon. He only knew it was traveling rapidly and at a high altitude. Then, from the luminous disk of his wrist-radio, a harsh voice spoke.

"Commander — Commander Temple. Commander, Commander Temple."

"Yes," Temple said, raising the tiny instrument. "What is it?"

"This is Lieutenant Rickaby speaking from the bridge," came from the disk. "Sir, a Martian balloon is passing directly overhead. It's blacked out by glare-refractors, but we can see it in the infra-beam."

"I can hear it," Temple replied. "It's coming toward the wharf?"

"It was, but it's veering now," Rickaby replied in an anxious voice. "It's moving back toward the east bank. Sir, it has cut our propulsion field."

Consternation swept over the patrol commander. "It did what?"

"Cut our field, sir. Shall I order the forward batteries to open up?"

"No, but tell the gun crew to stand by." Temple choked—and stopped.

From the cruiser there had come a dull boom, followed by a blinding flash of light.

A convulsive shudder shook Temple. He shut his eyes, visualizing a Martian balloon bursting into flames, and the scorched bodies of its pilots being swept like chaff toward the east bank of the canal.

"The gun captain fired, sir!" came in a groan from his wrist. "He misunderstood a signal, from the bridge!"

PROMPTLY Temple brought the the wrist-radio flush with his lips. "Stop him!" he shouted. "Did he hit the balloon?"

"No, sir; he missed. And the balloon's out of gunnery range now, sir. We'd have to use the arc mortars to bring it down."

"That's lucky."

"Yes, sir. But—they cut our field!"

There was a fierce insistence in Rickaby's voice, as though he had found new evidence of a yellow streak running up his commander's spine.

Temple's jaw muscles squared.

"Lieutenant?"

"Yes."

"Install the new Luxton propulsion field units immediately. Televise every ship in the fleet that every atom-motor in the fleet is to be capped with Luxton transformers. There isn't a beam on Mars can cut the Luxton field."

"Yes, sir. But what about those previous orders?"

"I know, I know," Temple barked. "The Admiralty instructed us to install the new field units next week. But this is an emergency. We're installing them immediately. I don't like you questioning my decisions, Lieutenant."

There ensued a silence. When Rickaby spoke again something seemed to move in his voice, as though he were swallowing an impediment.

"Very good, sir."

Temple swore softly, swung about, and advanced toward the tavern in long, angry strides.

Of one thing he was certain. If the Martians were seriously endeavoring to keep Patrol officers from coming ashore they had failed, for the tavern was ablaze with light. When Temple came from chilly dampness into warmth, youngsters a month out of training school eyed him with interest.

Despite the recent tarnish which had crept over his reputation, Temple was still an almost legendary figure to the younger members of his command. As he headed for the circular bar his eyes sparkled and his chin came up. Their admiration gave him a sense of solidarity with his far-flung command more stimulating than the highballs which he immediately began to stow away.

One — two — three — *hiccough*— four. He was setting the men a bad example, but he needed as much warmth as he could pack between his ribs this night. His friends, those big, tentacled, goggle-eyed infants, the Martians, had let him down.

"And he called for wilder music and stronger wine," a mocking voice said. "It's one way of forgetting, I suppose."

Temple turned slowly, keeping his elbow parked on the bar and blinking under the cold light from the low tavern ceiling. Buried under fifteen years of discipline, Temple's temper still had the

power to flare up at the drop of a hat. Lieutenant John Rickaby had followed his superior ashore. His service cap was tilted at an insulting angle.

The hostility between the two men was so intense even the youngsters sensed it now. They had never seen Temple with his temper blazing at white heat. But they had heard rumors—exciting rumors.

With calm deliberation Temple sat down his glass and looked Rickaby up and down.

"So!" he said.

He struck out savagely. Rickaby went spinning clear across the tavern. A dozen marine non-coms leaped to their feet in startled consternation. The young space officer collided with a table and thudded to the floor in a heap. Upon Rickaby's features was frozen a look of alarmed surprise.

SILENCE followed. Then Temple crushed his empty glass to splinters with a blow of his big fist. The non-coms were standing rigidly at attention.

All of them except one, a tall, pale youth with two chevrons on his sleeve. His eyes were so cold they seemed to congeal the air directly in front of him. Leaving the table at which he had been seated, he lurched unsteadily toward the Patrol commander.

"What do you want, corporal?" Temple spoke coldly. "Go back there and sit down."

Temple's words died. The eyes of the reeling lad had locked with his in a terrible, probing stare. The eyes were full of light, and yet they seemed somehow sea-cold and opaque, as though an alien and evil intelligence was staring at Temple through the windows of a borrowed brain.

In vain Temple struggled against the awful glare. With growing horror he tried, by sheer strength of will, to force the fixed eyes to swerve away in defeat. Madly he strove to overcome the growing fear that gnawed at his vitals.

Those eyes did not waver. Pupils, black like holes in a skull, continued to pour forth concentrated venom. He scarcely noticed the lad's hand come up, or the gleaming rayomatic pistol which jutted from his fist. Temple saw only the ice-cold eyes of a baby-faced killer who refused to avert his stare.

Torture! Physical torture can be something almost unendurable. But what Temple now experienced was infinitely worse. He encountered the torment of an inhuman intelligence bringing its enmity to bear in a way that seemed to suck at the marrow in his bones.

The rayomatic menaced Temple's forehead. The youth's face twitched. His whole frame shook, as though the inhabiting intelligence was having difficulty controlling the reflexes of the borrowed body it was using to slay with.

Temple's eyes grew wild. Vaguely he realized the fathomless abyss yawning beneath him, an abyss as deep as the measureless gulfs of space.

Then, with a thunderous roar, the abyss disappeared. In a flash of blinding light he saw the youth again. The rayomatic had dropped from his palsied hand and he was sagging back against the bar. Then he slumped to the floor, his face a vacant mask faintly rimmed with light. The same instant the Patrol Commander felt steely fingers biting into his shoulder.

"I deserved that sock," a husky voice said. "But you must realize now, sir, what we're up against. That lad was possessed. Demoniac possession! I saw it in his eyes the instant I picked myself up."

Temple turned slowly. Rickaby standing beside him, with a bruised and swollen jaw, as he ejected a radiation cartridge from a regulation paralysis blaster. Despite what had happened there was no bitterness in his voice.

The Patrol Commander's face did not soften.

"Lieutenant Rickaby," he said, after a pause. "I've been grooved into an pattern by an oath. It's called the Martian Command and its parts are mutually interdependent. By insulting me, you were insulting your own uniform."

Then he smiled at Rickaby. "I did drink a few whiskies. I put them away to help me endure the fatigue of a short tramp across the desert I am compelled to make."

"I understand, sir," Rickaby gulped.

Commander Temple glanced at the crumpled figure by the bar.

"He's not dead?"

"I don't think so, sir," Rickaby replied. "They say that demonaic possession doesn't permanently harm the victim. When the paralysis wears off he'll be wondering what hit him."

RICKABY'S eyes challenged Temple. "We'll have to strike back now, sir—with everything we've got!"

Temple nodded. "We will, Lieutenant. Now get that poor devil over to the Sick Bay and stand by until you hear from me."

Commander Temple left the tavern. His fists were clenched with anger in the pockets of his service jacket and there was the dry taste of fury in his mouth.

"All right, Lig Narun," he muttered. "You asked for it and you're going to get it."

Fifteen miles of arid, thorn-choked desert stretched between the Alpha Colony and the cylindrical stone tower where Lig Narun dwelt with his mate and tentacled offspring.

Temple covered the entire distance on foot. He arrived with his uniform caked with dust, his face a mask of sand and blood. As he stumbled up the last, high, wind-swept dune between the desert and the tower, his deepset eyes were slitted. His temper boded ill for anyone crossing his path and attempting to hinder his grim purpose. Friend or foe—anyone.

In the pale light of dawn the white tower resembled a giant's thumb protruding from a wilderness of sand. A film misted his vision, for he was tired, yet fierce rage drove him on.

He gave no thought to his own safety. Forces hostile to human life on Mars must be destroyed. He did not share Rickaby's belief that Martians possessed supernatural powers. But there were other powers—telepathy, clairvoyance, and hypnosis so deep it could burn the brain like an etcher's acid. Had Martians discovered that thoughts could kill?

Temple was in black shadow now. Keeping his hand on his rayomatic, he advanced along the east side of the tower, seeking the narrow gap through which he had once passed as a guest. Martians did not shut doors or draw bolts. They were truculently resentful of anything which subtly menaced their freedom.

A chilling sound, as if someone were smacking his lips directly behind him, made Temple swing about. But no one was in sight.

He found the gap and entered the tower. He did not dread the dismal interior so much as an intangible something that lurked without.

The interior of Lig Narun's abode was vast and dismal. Temple advanced with caution, creeping diagonally from a patch of darkness to the lowermost step of a circular stone staircase which spiraled up into shadows.

He mounted slowly.

At first he did not see the light, so elusive were it's shifting outlines. Then, gradually, the gleam brightened and spread. From its luminous core a woman's face grew, taking on substance slowly. An alabaster forehead came into view, wreathed in coppery hair, and lips parted in the faintest suggestion of a smile.

Her eyes were so soft and deeply blue that they filled Temple with a tender, throbbing pain. Finally he could see her form, graceful and lovely.

At the time it seemed only natural that he should find her here in this empty waste on Mars. He had known her all the years of his life, and yet he had never once taken her into his arms. For how can a man embrace his own subconscious image of all a woman could be if she is fairer than any creature who walks the earth?

He knew her name and spoke it aloud,

falling to his knee on the staircase and stretching out his arms.

"Lilith!" he whispered.

A WILD burst of mocking laughter echoed from the shadows overhead. The light vanished. He looked upward, and saw them—Lig Narum's tentacled offspring hiding at the top of the staircase. In their midst crouched the great old Martian's mate. Her round octopoidal body was quivering with malicious mirth and the words she flung at him increased his terrible frustration.

"That was no living woman, but the image of your desire, Earthling," she said in taunting accents. "Did you think you might clasp it—in your enemy's house?"

"You—you she-devil!" Temple choked.

So keen was his disappointment that for an instant Lig Narun's offspring seemed to draw closer together, as though they feared punishment daring to inflict such anguish upon an Earthling.

Lig Narun's mate raised her milk-white tentacles and waved them.

"If you would speak with your foe," she shrilled, "you must follow him into the black night of space. You thought us weak and primitive because we had no ships. But now we are as strong as you. Lig Narun has taken your fastest ship, Earthling, while you were groveling on your knees like a mewling fool. If you wish to talk to him he will answer you—from the mouth of arc mortars."

For an instant Temple stared in slack-jawed incomprehension.

"Then this is all a trick so Lig Narun could run off with our fastest space ship?"

"Yes, the armored cruiser *Aries*. I knew you would come here. Did I not look at you in the tavern through the eyes of an Earthling who tried to slay you? My beloved mate needed time, time. I helped him with all my strength."

Temple's hand had gone to his rayomatic. But he did not draw it. Instead, he swung about and dashed out of the tower.

He had all the pieces now. They made a grim pattern of deceit and black treachery. The Martians had prevented Rickaby from going ashore to stir up trouble. Then Lig Narun's mate had tried to kill Temple by means of a hypnotized boy. Although they had not foreseen Temple would rush to the tower, Lig Narum had been able to take advantage of the confusion caused by the Patrol Commander's absence to run off with the fastest cruiser in the System!

For three days and nights, now, across eight billion miles of space Commander Temple had fought exhaustion and despair. He had fought these things when his weary eyes closed and he had forced them open again with his knuckles. He had battled them with knees drawn up in sharp angles of torment. He wondered if peace would come when he was dead.

He no longer cared much whether he lived or died, but he did not propose to lose the ship in a ridiculous pocket between asteroids. The control room was riddled. A great drenching mantle of meteor dust was settling down over him. His hands were numb and—he had ceased firing.

Lig Narun hadn't. In the armored cruiser *Aries* some battle-scarred Martians were methodically testing instruments to see if they still functioned, while others still were hurling tons of molten metal at him through recoiling arc mortars.

Temple had blasted away at the other ship across three thousand miles of space, dismantling its steering vanes and pitting its translucent hull with swirling craters of flame.

He had lost his command man by man. They had gone down fighting, dropping over in an emergency blast port six feet equare. The port could only hold one person at a time.

The crew members had stepped up briskly, opening a star door and letting the former occupant of the port slide

out into the void. There had been no time for burial service or a lowering of the colors.

ONE by one the men who worked the arc mortars had perished in a swirl of flame. Rickaby had been last to crumple up. Yet he had continued to fire until the breath left his body. Now Temple was alone, caught in a seething suction vortex between two little asteroids scarcely seven miles in diameter.

A pair of jagged, iron-black rocks, revolving about each other eight billion miles from the Sun. The Patrol Commander's field intensity sights had told him all he needed to know about the small, binary system which was sending his outer gravity plates clanking into the void.

Two asteroids of nearly equal bulk, revolving in an eccentric orbit, could splinter an armored cruiser from stem to stern and fuse the fragments into chunks of glowing metal.

Fighting his weariness Temple stared at his big hands and flexed his stubby fingers. Grimly he promised himself that if the ship didn't crack up he'd climb out on the nearest of the two asteroids, and use those digits to put new life into his legs. He could do that by massaging the flesh under his knees, which had tightened up like the hide of a crocodile.

He had to admit that Lig Narun had courage. The *Aries* was closer to the jagged asteriods than his own fire-gutted cruiser, but from every port in its smoking hull arc mortars thundered.

Savagely he told himself that he'd die fighting. The crackup of the enemy ship came suddenly. A flaming rose blossomed in the darkness, and then withered slowly. It was difficult to tell whether the hull broke or melted, so blinding was the glare.

Temple's face grew somber. A hairy form had come hurtling against the visiport, its milk-white tentacles outflung. For a brief instant the implications of that failed to register in Temple's consciousness. When it did, a cry which rasped from his throat. It was drowned out by the screech of a revolving landing keel, and a shattering crash as his body shot forward.

A few moments later when Temple picked himself up, his senses were still reeling from the shock and there was a roaring in his ears.

"No funeral expenses," he thought. "They won't have to bury Lig Narun, and I'll be with him when Charon pushes off. It seems a pity when we might have died friends. He's just a big, rough child, but I can't let the Service down now. If he's alive I'll find him and when I do, it'll be curtains."

With grim deliberation the Patrol Commander thumped at his knees to restore the circulation. Flexibility returned to his limbs in slow, painful stages. Then he crossed to the controls. Tests showed they still worked. "Well, how do you like that! The juice is still on and there's enough U-two-thirty-five in the generators to lift her off this asteroid."

He tried out the anti-grav disks by manipulating a rheostat with clumsy fingers. The disks were all right. So he decided to start searching the craggy surface of the asteroid for Lig Narun, at once.

First he strapped a cold light lamp to his wrist and clamped on an oxygen mask. The ship was resting on a jagged granite outcropping, beneath a cliff wall honeycombed with luminous caverns. Emerging through the thrumming gravity locks, Temple gripped a spanner bar with both hands, and lowered himself to the ledge by arching his long body backward.

On both sides of him the spongy darkness seemed to soak up radiance, the better perhaps to mold itself into enormous shadow shapes. Gargoylesque animals and gigantic human forms seemed to tower evanescently in the gloom beyond the wide swath of light cut by his wrist lamp.

CAUTIOUSLY he moved forward until the jagged rocks beneath him began to shift, and he found himself swaying to and fro like one on a raft.

He was hugging the cliff wall and tugging at his gravity belt when a large, hard and flat rock from the precipice above struck him a glancing blow on the forehead. With a startled cry he swung about. He missed his footing, and went sliding over the outcropping into the void.

How he caught himself he never knew. He was painfully aware of a hard, cold surface cutting into his palms as he hung on. Space tensions ripped and tore at him when he tried in vain to lift himself to safety. There was nothing beneath him except space.

SLOWLY his hands began to grow numb. He knew, then, he couldn't hold on much longer. How could anyone last long anyway in this awful cold.

Something cold and stringy slithered around his body, and tightened like a noose. The next instant that something was lifting him up while his senses swam dizzily.

Up and up, over the ledge to safety he was drawn. Then he realized that stringy object was a white tentacle. He was laid flat on the ledge and the tentacle uncoiled from about him. The birdlike face of Lig Narun gazed tearfully down at Temple.

"You'll be all right in a moment," a grief-choked voice said. "Keep quiet. Ah, Temple, my friend, I am sorry."

Temple closed his eyes in bewilderment. What did this mean?

He opened them again. Beside him squatted a great, hairy body surmounted by a lolling head. Temple's heart began to beat fast. Death loomed near.

"Temple, I wish that I might die a thousand deaths," the old Martian sobbed. "My body deserves to be consumed and my ashes cast to the void. I am not fit to shake the hand of a man like you."

Slowly, painfully Temple's faculties steadied. He saw his enemy plainly—saw the tired old body, bent with grief, the fluff of hair on its brow, and the great, cavernous eyes, like smoke-filled meteor pits.

"You saved my life," Temple said faintly. "Why, Lig Narun? Why—when you hated me so?"

"Temple, you were always my friend," the Martian replied. "I have never hated you."

Temple stared at him as if he hadn't heard aright. This didn't make sense. It didn't add up.

"Then why did you make all that trouble?"

"Your propulsion field drive was crippling our offspring."

Temple gazed at the Martian in amazement.

"I never knew about it," said the commander. "For months your atom-motors gave off infra-radiant vibrations which arrested our younglings' growth. We would have become a race of cripples. We thought you knew."

Lig Narun saw the horror in Temple's expression. Fresh tears started from the old Martian's eyes.

"Temple, I did not know that you had re-capped your atom-motors. I did

*(Continued on page 99)*


# Can't Keep Grandma In Her Chair

**She's as Lively as a Youngster—Now her Backache is better**

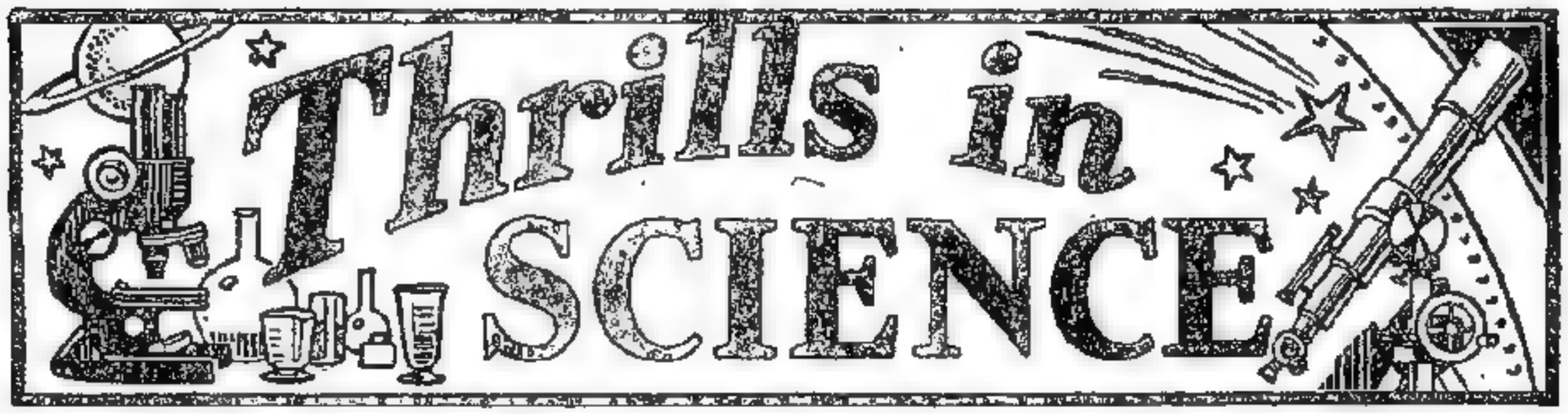
Many sufferers relieve nagging backache quickly, once they discover that the real cause of their trouble may be tired kidneys.

The kidneys are Nature's chief way of taking the excess acids and waste out of the blood. They help most people pass about 3 pints a day.

When disorder of kidney function permits poisonous matter to remain in your blood, it may cause nagging backache, rheumatic pains, leg pains, loss of pep and energy, getting up nights, swelling, puffiness under the eyes, headaches and dizziness. Frequent or scanty passages with smarting and burning sometimes shows there is something wrong with your kidneys or bladder.

Don't wait! Ask your druggist for Doan's Pills, used successfully by millions for over 40 years. They give happy relief and will help the 15 miles of kidney tubes flush out poisonous waste from your blood. Get Doan's Pills.

(Adv.)




Thumbnail Sketches of Great Men and Achievements

By OSCAR J. FRIEND

# THE SHIP OF THE FUTURE

## *Captain Frank Whittle Designs Jet-Propulsion*

THE little boy watched intently as the man puffed his cheeks and filled the toy balloon with air. His earnest eyes seemed to grow wider with each momentary swelling of the thin rubber sphere.

"Now, watch!" said the man as he held the balloon poised and then released it.

The boy laughed in delight as the balloon darted erratically about, shrinking with a sort of Bronx-cheer noise as it was propelled through the air by its own air exhaust.

"I want to do it!" exclaimed the child, pouncing on the deflated little rubber sac. "Why does it do that, Uncle? What makes it fly?"

"That is a sort of self-propulsion business, Frankie," explained the man gravely. "It is hard to explain to a little boy, but it is a counter-force. When you throw a ball real hard you fall back from the effort. That, in a way, is what happens to the balloon. It throws the air away through its tail and falls away in flight on the opposite side."

"Is that what makes airships go?" asked Frankie.

"No, they use propellers to drive themselves through the air—but this principle might some day be used at that. Why not?"

The boy looked a bit puzzled as he puffed his cheeks to blow up the balloon, and then promptly forgot the matter in the delight of playing in this new way with the toy.

But little Frank Whittle did not really forget this little talk. As the years rolled by and aviation grew up, the idea recurred to him many times. He became intensely interested in aerodynamics, a typically air-minded British youth.

While still in his teens he joined the R.A.F. as an apprentice. He showed such remarkable aptitude and produced such unusual designs in aerodynamics that he was diverted from active service and sent to a training college at Cranwell. He finished there in 1928 with the highest award in aeronautical sciences.

He was now a plane designer and an aeronautical engineer and still a very young man, but he was trained to work with wings and air propellers. Plane design was improving, motors were improving, fuel was improving—but men still flew much in the style and pattern set by the Wright brothers at Kitty Hawk in 1903.

There was a limit to the speed at which a plane could fly. Of course, this limit had not yet been reached in 1928, but it was mathematically calculable.

At certain altitudes and beyond certain prop revolutions the propeller could not "bite" the thin air successfully or build up compressed air around the propeller so that the blades would only spin, without exerting extra pulling force. Could anything be done to overcome this difficulty of physics?

CAPTAIN FRANK WHITTLE

Then Frank Whittle went to Cambridge University for further study. It was while here that he got to discussing aeronautics of evenings with four friends—Johnson, Wing Commander Lees, Tinling and Williams. Whittle recalled the childhood experiment with the penny balloon, and he now enlarged upon it.

"Hero of Alexandria invented the steam turbine more than two thousand years ago,"

he declared. "But he never put it to any good use. It remained a scientific toy until the coming of the turbine engine. But nature beat us all with jet propulsion methods. Clams and squids have been squirting streams of water to propel themselves ever since the Paleozoic Age."

"Just what are you getting at, Frank?" asked one of the group with a frown.

"This!" said Whittle, taking the plunge. "If jet propulsion works with water, why wouldn't it work with air—or gas?"

"Old stuff," said one. "You refer to the exploding rocket principle, of course."

"But I don't," said Whittle decisively. "I mean the steady flow of gas ejection to push a plane along—sort of like a deflating balloon."

"By Jove!" exclaimed Commander Lees. "Maybe you have the inkling of an idea there, Frank. What would you use for fuel?"

"Perhaps petrol combined with liquid air and fired through a stern tube. It would mean a radical departure in plane construction, but I believe it could be done."

Tinling and Williams, former R.A.F. men themselves, were now operating a small but successful business together. They became quite enthusiastic over the idea.

"You design such a plane, Frank," they said, "and we'll raise the money to finance the building of a flight ship."

"Gentlemen, you have made yourselves a proposition," said Whittle tersely.

In 1930 Frank Whittle applied for and received a patent on a jet engine which he called the Gyrone. It worked, and the model plane built about it also worked. But government agencies and even private industry are very hard to convince upon matters of radical departures from the accustomed way of doing things.

Industrialist and capitalist, one after the other, turned Whittle's whistling contraption down. It was still full of bugs, propeller ships were improving daily, nobody would ever want to fly as fast as Whittle claimed his new type of plane would eventually go, the fuel waste was extravagant, and so on.

Finally Whittle gave up in disgust and tried no further. The R. A. F. was keeping him very busy on test flights about now, anyway. So the jet-propulsion plane lay fallow because hide-bound conservatives couldn't see the advantages of developing high air speeds.

Then came the stirring of the *Blitzkrieg* in Europe. A madman with a shoebrush mustache who was no longer funny was doing incredible things in Germany. The Messerschmitt 109 was out-flying all other types of planes in the arena of the Spanish civil war, doing well over three hundred miles per hour.

So the aircraft industry became uneasy, and attention was turned again to Captain Frank Whittle and his dream ship which could develop unheard of air speed.

His friends became active again and organized a company called Power Jets, Ltd., and installed Group Captain Whittle with some assistants in an old disused factory in a factory town.

Now Whittle went to work in earnest, while Hitler rolled across Europe and nations frantically tried to overtake the *Luftwaffe*, and airplane speeds built up to the incredible heights of better than four hundred miles per hour.

Problem after problem came up, to be met head on and grimly defeated. Frank Whittle constantly improved his jet engine, advancing many designs which are still under the ban of military secrecy. However, there came the bright May day that Flight Lieutenant Sayer made the first test flight of the Whittle plane in southern England.

A sleek fuselage, a pair of wings, no whirling prop at all, and built closer to the ground. That was Frank Whittle's plane. Instead of using liquid oxygen to be mixed with fuel in a combustion chamber, the Whittle design simply drew air in at the nose of the ship, compressed it, heated it and then mixed it with fuel injected into a special central chamber to be ignited and blasted out through a rear nozzle.

Lieutenant Sayer started his engine. The only sound audible was a whistling like that of a giant tea-kettle on the hob. The queer craft rolled across the grass at a steadily mounting pace, took off and soared up into the blue. For twenty minutes it maneuvered beautifully and then returned safely to earth.

The toy balloon principle was here and now vindicated for all time. By September of 1941 the Whittle engine was sent to America and in less than one year tests and test flights were under way in the United States.

Scarcely thirty-seven years old today, Group Captain Frank Whittle of the R.A.F. has revolutionized the airplane industry and has perhaps supplied the first practical model of the space rocket ship of the future!

# AN ANGEL RUSHES IN

## *The Amazing Career of Sister Elizabeth Kenny*

SHE was only twenty-three years old, an Australian "bush nurse" that night in 1910 when she stood by the bedside of a little girl child and surveyed the pain-racked body with puzzled eyes. But Elizabeth Kenny came from strong pioneer stock, the daughter of Scotch-Irish parents, with strong religious background and imbued with dauntless courage.

She had wanted to become a missionary, and her old friend and mentor, Dr. John McDonnell at Toowoomba, had told her that missionaries must know how to nurse.

The missionary idea was lost in the intricacies of nursing people back to health. She spent eight years studying anatomy in order to help her invalid brother regain the use of his limbs. And now here she was, strictly on her own in the Australian hinterland known as the "outback" country.

In this dimly lighted room she looked down upon a type of sickness known to the natives as "cow disease." People just took a fever and went lame.

This was Elizabeth Kenny's first personal experience with the disease. She studied the symptoms carefully and then sent an urgent message to Dr. McDonnell, describing the ill-

ness and asking for instructions.

Dr. McDonnell easily recognized the disease as poliomyelitis, or infantile paralysis, for which there was no known preventative or cure. A doctor could only try to allay suffering and then, if he could, prevent the crippling after-effects by immobilization of the affected muscles according to conventional treatment. So Dr. McDonnell wired back:

"Symptoms you describe indicate infantile paralysis. Use your best observation and judgment with symptoms presenting themselves."

What use was it to telegraph a history of the disease to the struggling nurse? Why explain that it was a virus infection which attacked the spinal cord and that the crippling effect depended on how badly the cord was deteriorated?

Thus, armed only with her vigorous youth, her determination to relieve human suffering and her faith in God, Elizabeth Kenny rolled up her sleeves to attack the, to her, strange and unknown enemy that medical books called pollomyelitis. She had at hand only the simplest of things with which to work. So she proceeded to use them.

At the very outset her sharp nurse's eyes noted one thing all the medical men heretofore seemed to have overlooked. The victim had spasmic pain and contraction of muscles. How to relieve this condition?

"Get me some hot water," she directed the distraught parents. "Towels—or tear up a blanket. Make haste."

For hours this brave girl wetted squares of torn blanket, wrung them out and applied the hot, damp cloths to the aching limbs of the child sufferer. To her delight she found that this treatment—the only sedative she could think of—relieved the pain. The muscles relaxed, and the child dozed off to sleep.

She said a fervent prayer as she waited beside the bed. After a space the child moaned softly and opened her eyes.

"How you feel, Amy?" asked the nurse gently. "Do you want anything?"

"Please—I want more rags that wells my legs," the little patient whispered.

And she got them. Nurse Kenny resumed her hot "foments." All night long she labored, her medical tools being heat, water, cloths, and her untiring service. In the morning the child was free from fever and pain and was relaxed. But she could not move her legs.

In the middle of this crisis an agitated neighbor rode into the farmyard with the announcement that his own ten-year-old son and four-year-old daughter were stricken with the disease and could the nurse find time to help, to tell them what to do.

Elizabeth Kenny smiled encouragingly and never gave thought to her own weariness. Instructing the mother of little Amy to continue the hot, damp cloth treatments whenever the child was awake, she mounted her horse and rode to the home of the neighbor.

Here she repeated the only treatment she knew—the hot foments. And she brought rest and relief to two more stricken children.

As infantile paralysis generally strikes down several children in a given area when it makes its dread appearance, it was not surprising that six children were almost immediately under the courageous young nurse's care. And she applied the same treatment in each case.

Now came the problem of how to conquer that aftermath of paralysis. Elizabeth remembered her study of anatomy and her exercises and massages which had helped her brother.

Still following Dr. McDonnell's instructions to use her best judgment, she noted that the attacked muscles had relaxed and seemed recovered. It was the muscles which had not not been subject to the spasms which now did not seem to respond to the will.

That this was the direct opposite of the matter as understood by the medical profession, Elizabeth Kenny did not know. Had she known, it would probably have made no difference to her. She was doing what she saw was the sensible thing to do.

She began massaging and passively manipulating the dormant muscles, re-educating the lazy muscles to obey orders, to learn to

SISTER KENNY

work again. Her knowledge acquired in the care of her own brother stood her in good stead now. Presently all six little patients were sitting up.

Before spring faded into summer all of them were out of bed and running agilely across the hills and playing as happily as though they had never been stricken.

Sister Elizabeth Kenny was happy and pleased. She felt that she had done an honest job of nursing, nothing more. Her very ignorance of the dread disease was her shield and buckler.

And then Dr. McDonnell came riding out into the bush country to learn how she had fared.

"The six children?" she repeated in a matter-of-fact way. "Oh, they are quite all right."

"What?" gurgled the good doctor. "You—you don't mean they're recovered?"

"Of course they are. Shouldn't they be?"

Dr. McDonnell became highly excited. He had to see the patients. He was incredulous.

He began firing questions at the surprised Elizabeth.

Finally:

"Elizabeth, you have treated those cases for symptoms exactly the opposite of symptoms recognized by orthodox medical men. More than that, you have treated the symptoms themselves exactly the opposite as they treat them. I have a case of infantile paralysis near home. I want you to come and show me what you did."

Willingly Sister Elizabeth Kenny went with the physician and demonstrated. Within days McDonnell's patient was on the highway to recovery.

"This is amazing, my dear girl," said the doctor in awe. "You have discovered a revolutionizing treatment for poliomyelitis. You must go on with your work. The way before you will be hard. You will know heartbreak and humiliation. Even the medical profession will oppose you. Have you the courage to fight?"

Nurse Elizabeth Kenny drew a deep breath and smiled bravely into the kindly doctor's eyes.

"For the sake of the children of the world, and with God to help me, I have," she answered him.

"God bless you, my dear," murmured the old doctor.

And God bless Sister Elizabeth Kenny, indeed! For thirty-three years she has given battle to the dread disease that cripples helpless children and fought pig-headed doctors who refused to accept her teachings which had proved better than eighty-five percent efficient in effecting complete cures.

Today Sister Kenny's methods are recognized the world over. Clinics have been established in many places—having once got a start in Minneapolis and Australia. Today, not yet sixty years of age, Sister Kenny can look upon her work and find it good. Out of the Australian bush country she has brought the miracle of a treatment technique which is recognized by the highest medical authorities on infantile paralysis.

# THE LITERARY PIANO

## *Christopher Sholes and the Invention of the Typewriter*

HIS name was Christopher Latham Sholes, and he was born in a small town in Pennsylvania in 1819. And if you can state offhand from the foregoing information what great practical invention he is primarily responsible for, you are better posted than the average quiz fan. So we will tell you right off that Chris Sholes revolutionized the business world by his invention of the first practical typewriter.

Sholes was only fourteen years old when he was apprenticed to master the art of printing in the shop of his hometown newspaper. Thus, at an early age he became familiar with type and with the history of printing.

At the outset, let us frankly consider the fact that no lack of scientific knowledge or mechanical ability delayed the invention of the typewriter until deep in the second half of the nineteenth century. In actuality, everything was propitious for its development.

The art of printing was far along, individual type-letters were old stuff, a flexible and workable keyboard was on hand on every piano, metals were rapidly improving, and mechanics and thinkers were running loose over the face of the land.

But nobody built a machine to take the place of handwriting. Businessmen were flourishing penmen—and nothing would replace the horse. People simply could not be sold on anything so simple and so close to their concrete comprehension. Socially, the use of typed messages over scholarly handwriting was strictly taboo.

Thus, it seems inevitable that the typewriter would be invented by a man sufficiently impractical to become thoroughly interested in the idea and at the same time sufficiently persistent to complete the task in spite of all discouragment. Such a man Christopher L. Sholes proved to be.

When he grew up, Sholes wandered westward, filling various responsible positions in his time, by turns being a compositor, printer, editor, postmaster, a member of the Wisconsin legislature, a commissioner of public works, etc. On the side, Sholes was fond of poetry and chess.

Such a man was he when he finally gravitated to Milwaukee and fell into the company of two other men—Samuel Soule and Carlos Glidden. Sholes was running a small job-printing shop and he became disgusted with the crude device of a hand stamp for numbering tickets, ledger pages, blank checks, and things of this nature. He wondered why a better and more accurate numbering device couldn't be made. He mentioned this idea to Soule one day when the latter visited him at his shop.

Soule became immediately interested, and the two of them pooled their brains and finally came up in 1866 with a simple machine that required only a few keys and which could mark numerals on paper or cardboard. It wasn't as fast or as perfect as the numbering machines today, of course, but it worked. It had solved Sholes' personal problem.

Then Glidden came in one day, and Sholes showed him the stamping machine. Glidden was much impressed. He thought intently for a few minutes. Then he said:

"If it can write numbers, why can't it write letters?"

Shole stared at his friend in puzzlement until Glidden's meaning dawned on him. At once he became enthusiastic over the possibilities.

"Let's call Soule into conference," he said. "This is too big an idea to drop."

And here is where Sholes' practical impracticalness shone forth. The three friends took thorough stock of the previous work which had been done in the field, from Foucault's machine to reproduce raised or embossed characters for the blind to read on up to the more promising contraptions of Beach and Francis.

Frenchmen, Britishers, Americans, even a Tyrolian had invented writing machines of various kinds which worked to a certain extent—and which had not been accepted by the general public.

They read an article in *The Scientific American* which boldly prophecied that the "literary piano" would eventually completely supplant handwriting. And so these three intrepid men set to work to make that prediction come true.

In 1868 they took out patents on their completed machine, the principal new feature of which was that they had a circular set of rods which converged in such a way that each could strike the paper at the same spot without painstaking preliminary adjustment. Otherwise, their machine was quite similar to others already tried. The use of a four-row keyboard, an inked ribbon, etc., having already been invented.

The only thing was that all machines printed in caps only and on the under side of the paper so that the operator could not see what he was writing. But the Sholes, Glidden and Soule machine did work without breaking down. Nobody got on fire over the invention but Sholes. He began writing letters—all of his correspondence—on his machine, becoming quite proficient at it.

One of these letters came into the hands of a business man named Densmore, who had the vision to see the future possibilities of the thing. Equally as important, he had the money to invest. He bought his way into the partnership by paying the tinkering inventor all previous expenses. And then he told them frankly that, while Shole was rather good at writing on his pet machine, it was too fragile and cumbersome to be of general practical use and too crude and complicated to be considered for a minute by any manufacturer of metal parts.

This straight talk discouraged Soule and Glidden, and they dropped out of the partnership. Sholes, however, bristled indignantly. But he wasn't pig-headed. He saw what Densmore was driving at.

"All right," he agreed, "if you'll supply the money, I'll build another machine."

"That's what I am doing here," answered the practical Densmore. "I'll supply all the money you need. Your job is to build a machine that is simple and which will stand up under hard usage. And I'll see that it gets hard and practical use."

Sholes didn't quite understand how Densmore could encompass this, but he set to work. Densmore surprised him. He sent machine after machine to different places to be tried out by professional men. One of these was a court reporter in Washington named James Clephane.

Clephane was a severe critic and a tough operator. He mastered each machine he received and he punished it. But he gave such minute criticism that his advice was invaluable.

Sholes almost despaired, but he didn't give up. All in all, he built more than thirty different machines in five years' time before both he and Densmore were satisfied. In 1874 he had come up with a model which looked more like a Singer sewing machine than a

THE SHOLES TYPEWRITER

typewriter. But it worked. It had a roller, visible typing, a keyboard and action quite similar to the typewriter of today, an inked ribbon, and it was far faster than handwriting.

By sheer obstinacy and perseverance, backed by Densmore and needled by Clephane, Christopher Sholes evolved a practical typewriter that would stand up under work and strain.

Of course, the business world had yet to be sold on the machine, and nimble-fingered operators had yet to be trained, and mechanics had to learn to repair them, and the curse of social bad taste had to be lifted. But the manufacturing obstacles had all been overcome.

In 1874 the two men called on the Remington family of Ilion, New York. The Remingtons were so enthusiastic that they bought the patent outright, set about manufacturing the machine and convincing a skeptical public.

A few minor changes were made in the machine, such as the introduction of lower case letters and the shift-mechanism to reduce the number of keys needed. But the fact remains that Christopher Sholes actually built the first successful typewriter and supplied the machine upon which Mark Twain typed his final draft of TOM SAWYER, the first author to use a typewriter to prepare a story for his publishers.

Christopher L. Sholes introduced the typewriter to the world, and in his own way vastly affected the course of modern life.


*More*

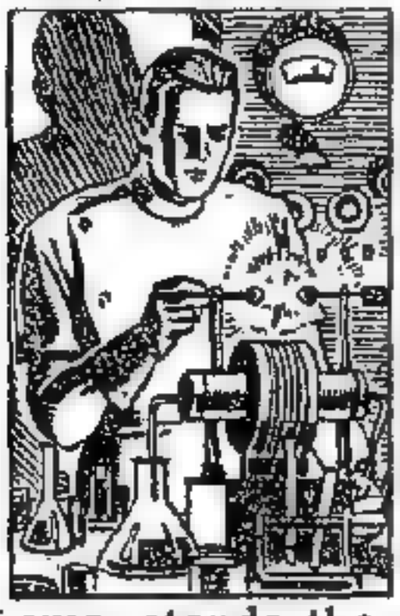
# THRILLS IN SCIENCE

PLUS MANY OTHER INTERESTING FEATURES NEXT ISSUE

# The RADIATION of the CHINESE VEGETABLE

By C. STERLING GLEASON

***Harold Dare, Favorite of the Films, Snatches Some Precious Herbs and a Lovely Girl from the Clutches of Dandy Diavolo!***



OUT in the West, where the suey is a little stronger, far out West, where the noodles grow a little longer—in Hollywood, that distant metropolis of millionaires, movies and Mammon, that capital of sin and the cinema, stands the quaint Oriental building which houses the chop-suey parlor of lovely Wun Look.

Here are wont to come all Hollywood's greatest, to refresh and rejuvenate themselves with Wun Look's superlative chop suey. Hither at noon come busy captains of industry, to fortify themselves against the grilling afternoons of golf. Hither, after strenuous days of whole-souled labor for Art's sake, come famous film stars, many of them remaining long after the curfew has sounded, held simply by the lure of Wun Look's magnificent menus.

Hither often comes that supreme figure in filmdom—Harold Dare, greatest of screen heroes, and also connoisseur and patron of the art of chop-suey preparation. Here, too, is sometimes seen Dandy Diavolo, that peerless villain of the Flicker Films, whom millions of right-minded film fans hate as the lifelong persecutor of the great hero.

Who knows how many of Harold Dare's great benevolences have owed their inspiration to the subtle, satisfying savor of Wun Look's chop suey, or how many of the diabolical deeds and devious devices, as crooked and intertangled as the very noodles of Wun Look's chow mein, have been incited by some mysterious ingredient of that inscrutable black sauce which lends the last delicate piquancy to the eggs fooyong?

Yet even the idyllic occupation of chop-suey preparation is not fully free from the frowns of Fate. Came a day when the great Harold Dare spoke gently to the Chinese maiden, seeking to learn why the chop suey had lost its wonted savor. With great tears in her lustrous dark eyes, the girl answered him: "Oh, Mr. Harold, that is what all the people ask to know."

She told a tearful tale of sordid commercialism, of a monstrous monopoly that threatened to strangle the essential art of chop-suey making. An unscrupulous broker in Chinese vegetables—Yet Un-Hung by name—had cornered the market and would supply only his own chain of inferior chop-suey palaces with the ingredients necessary to the synthesis of AAA1 chop suey. It was his plan to force out all competition by cutting off the supply of the constituents of chop suey.

"Is there no other way to get the vege-

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EDITOR'S NOTE

SCIENTIFICTION HALL OF FAME STORY

SOME stories are forgotten almost as soon as they are printed. Others stand the test of time.

Because "The Radiation of the Chinese Vegetable," by C. Sterling Gleason, has stood this test, it has been nominated for SCIENTIFICTION'S HALL OF FAME and is reprinted here.

In each issue we will honor one of the most outstanding fantasy classics of all time as selected by our readers.

We hope in this way to bring a new permanence to the science fiction gems of yesterday and to perform a real service to the science fiction devotees of today and tomorrow.

Nominate your own favorite! Send a letter or postcard to The Editor, STARTLING STORIES, 10 East 40th St., New York 16, N. Y. All suggestions are more than welcome!

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Despite Dare's warning, Wun Look was taken prisoner

tables?" demanded Harold Dare, his great soul instantly filled with righteous indignation against the conscienceless market manipulator, whose merciless machinations threatened the very foundations of this essential industry.

"No, Mr. Harold," replied the girl. "They will not grow in America. Only in a certain part of China, where the weather is kind."

"Then," said Harold, in sudden strong resolution, "we shall grow them here." And from the great Dare research laboratories, maintained by the celebrated screen star in the interests of the public welfare, came famous scientists with complicated electrical instruments, to conduct tests and experiments, and to delve deeply into the mysteries of growing the exotic Chinese plants.

WITH the full facilities of the Dare laboratories concentrated upon the problem, the solution was soon found. Treated with regular applications of high-frequency electric current, the essential vegetables responded vigorously and grew with incredible rapidity. The stimulating action of the electricity, in accelerating cell growth and aiding metabolism, caused them to grow to twice the size of the ordinary plant, and their flavor was even better than that of the imported vegetable. A few test dishes of chop suey made with the new product were sampled by famous connoisseurs of Chinese cookery, and pronounced superlative in the nth degree.

At length the research was complete. Wun Look, in her gratitude, planned a dinner for

Harold Dare and his famous chief engineer, the great Scott, under whose direction the experiments had been carried on.

In the basement of the Wun Look's "chop sueyrie," where most of the research had been carried on, against that background of modern science, she would serve a banquet. She would serve with her own hands a banquet in traditional Chinese style—a banquet the most august mandarin might look upon with envy.

To Harold Dare was sent a note requesting that he set a date for the event. That question being referred to Dare's synchronizing social secretary, the tenth of the month was chosen. It was obviously necessary to make arrangements for photographers to be present, to record for posterity this crucial moment that marked the inauguration of a new era in the chop-suey industry.

The proper papers were prepared by the secretary, and the file left on Dare's desk for signature. When the great star stepped into his office to give executive matters a few moments' attention before leaving the lot, he found this paper, made a mental note of the date, and affixed his signature to the order.

When he had left the office, just at dusk, no one saw a furtive-faced man slip into the room, close the door behind him, and a moment later make a hurried exit and disappear into the darkness. At least, if anyone saw him, it is not recorded. But, when Harold Dare's secretary prepared the necessary memoranda for arranging the event, he found that apparently the star had decided to postpone the dinner one day; for the numerals "10" had been crossed out, and "11" substituted.

It was early in the evening of the tenth that Harold Dare drew up before the Wun Look chop sueyrie and, dismissing his chauffeur for the time being, strode into the ornate dining room of that celebrated palace. He thought it not a little strange the photographers were not yet there to welcome him, but since no one was in sight, save several undistinguished patrons dining in private booths, he passed back to the stairs and descended to the basement.

"Wun Look!" he called. There was no answer. The basement was dark, except for a crack of light that showed beneath the door of the improvised laboratory. He grasped the knob and stepped into the room—

Harold Dare felt strong hands grasp his wrists. He struggled, but vainly. A wide leather belt was drawn swiftly about him, pinioning his arms to his sides, and the cold muzzle of a revolver pressed against his cheek.

"Not a word, Harold Dare!" hissed a familiar voice in his ear, after the thugs had forced him into a chair.

"Dandy Diavolo!" The words came instinctively to Dare's lips as he recognized his villainous arch-enemy.

"Yes, my proud hero," sneered Diavolo, "you are my prisoner. You thought to come to a banquet, celebrating another of your so-called triumphs. But I have other entertainment for you, my fine fellow."

Two ruffians drew Dare forward and forced him back into a chair. One seized each arm, while others pulled him down to a prostrate position and bound him fast.

"What does this mean?" demanded Dare.

"It means," replied Diavolo, with an evil leer, "that you have gone a step too far in what you term your benevolences. You little recked, when you gave orders to your laboratory men to attempt to grow Chinese vegetables under radio-frequency stimulation, that you were running counter to powerful interests. You did not realize that I myself own a half-interest in the Yet Un-Hung chop-suey chain. You perhaps do not know that I myself am responsible for your being here today instead of tomorrow. I caused one of my men to alter the date on the requisition after you had signed it, so that while you understood that the dinner was to be on the tenth, all preparations have been made to receive you on the eleventh. And now your ambitious scheme is to be the cause of your own downfall!"

THEY were baring Harold Dare's chest, and upon it placing a large square of metal-meshed cloth. Behind him, they slipped a similar area of the same material, so that the cold metal was firmly in contact with the flesh. To each they attached a long flexible cord, which they draped over chairs and extended to the large panel of the radio-frequency oscillator which had supplied the current used in treating the vegetables.

"You will observe," remarked Diavolo, as he made fast the ends of the wires to terminals of the oscillator, "that only the best type of equipment is used by the Dare laboratories—a fact for which I am personally grateful. This oscillator is designed to furnish considerably more power than would be necessary to treat double the number of plants I see here. I note with approval that, instead of the spark type of apparatus, which is commonly used— even by hospitals—the

Dare technicians have substituted a powerful vacuum-tube oscillator, capable of delivering continuous-wave oscillation, which carries more energy and thus has greater thermal effect than the damped wave emanated by a spark circuit."

Dare understood his reference. He himself had had experience with that type of appatatus. Once, when he had been afflicted with a cold and a sore throat—which was extremely inconvenient in that it interfered with the filming of the current talking picture then in production——Scott had recommended that he be treated by diathermy, and had had the equipment sent up to Dare's residence. Doctor Fredericks, Dare's personal physician, then administered a treatment in much the same way as Diavolo was now preparing to do.. The electrodes, placed on either side of the patient's chest, were energized by a high-frequency current which, in passing through the high resistance of the tissues, dissipated much of its energy in the form of heat, with the effect of stimulating the circulation and clearing up the congestion. In a few moments the current had done its work, and Dare, glowing through and through with a gentle heat, had risen, cured by the treatment.

"It is very thoughtful; Diavolo, to take the trouble to give me a diathermic treatment," said Dare, "although I must really confess I do not feel the need of it at the present time."

"My purpose," replied Diavolo, "is purely educational. I propose to demonstrate to you that high-frequency oscillations, although useful in stimulating the growth of vegetables and curing colds, may be put to even better use in ridding the world of a person whose life has been spent in amassing a great fortune, simply by making millions of film fans hate me. By passing through you the full strength of the current generated by this equipment, I shall produce heat just as in medical diathermy—by the dissipation of energy in cell tissues. But an oscillator of this power will raise the temperature far above the slight warmth produced by the ordinary outfit. One can cook a steak, by passing a heavy radio-frequency current through it. And that, Harold Dare, is to be your fate—to be cooked alive, by the very instrument of your intended triumph!"

With a stroke of the pliers he cut the wire that led to the long row of tiny plants, each with its miniature electrode gently clasping the frail green stalk. "Lest any of the current be diverted from our purpose, we shall disconnect the vegetables from the apparatus."

There was a noise at the door. Harold Dare heard it first.

"Stay out, Wun Look!" he cried. Too late. One burly ruffian flung open the door and seized the startled maiden. Before she had even realized what was happening, he had clapped a hand over her mouth and drawn her roughly inside. In an instant they had improvised a gag and were binding her to a chair. The beautiful almond eyes were filled with tears of uncomprehending woe.

"Never mind, Wun Look," said Harold Dare, gently. "They've got me, but they won't hurt you."

"Fool!" sneered Dandy Diavolo. "Little you know about it. We have two distinguished guests. Certainly we must entertain the lady in a manner befitting her station. Hook her up men!"

The henchmen uncoiled another pair of wires and prepared to run parallel connections from the oscillator. With dismay Dare saw their evil intent. He knew it was futile to attempt to appeal to the finer feelings of the fiend. Better to try to touch the creature's selfish impulses.

"Do you realize, Diavolo," he said, "that with Wun Look will die the secret of preparing the finest chop suey that has ever been known to mankind?"

"You are right, Dare, for once," agreed Diavolo, with an evil smile: "That would be true—but I have foreseen that circumstance. Before the girl leaves this mortal sphere she shall tell all. When she feels the insidious thrillings of the high-frequency penetrate to the very marrow of her bones, and feels a mysterious heat begin to burn the tissues, she will soon divulge the secret recipe."

"You display your ignorance of the Chinese character," said Dare. "You apparently do not realize that, rather than give up the cherished secret that has been handed down through the centuries from mandarin to mandarin since the time of Confucius, she will perish with a smile. Would she shame the memory of her ancestors, who faced unspeakable tortures or even death itself to protect the formula from the hands of infidels? If you believe so, you do not know Wun Look!"

"Perhaps you are right," conceded Diavolo, grudgingly. "But it will do no harm to try."

"You are taking grave risks, Diavolo,"

pleaded Dare. "You may easily carry the experiment too far, and snuff out the life of the delicate maiden. Would you deprive the world of the final fruit of thousands of years of development—the finest flower of the chop-suetic art? Think what it would mean to you, Diavolo. Could you carry on your work as master villain of the films, unsustained by the splendid nourishment of Wun Look's chop suey? Imagine yourself at the end of a long day of grilling work before the camera—your energy depleted by hours of giving the best that is in you—in putting forth to the world your magnificent conception of the true soul of the sneer, the wholly evil leer, all for the sake of your Public. Then think what it means to be able to sit down to a bowl of steaming chop suey, to feel your spirit revived by the savory odor of exotic Chinese vegetables perfectly prepared by the skillful hands of Wun Look, to feel the sharp tang of the suey send shivers of satisfaction along your spine, and your energy restored for another day of artistic endeavor. Can you bear to deprive yourself of such a comfort, or to take from the cinema world its chief staff of support, to cut off the principal source of inspiration of innumerable Hollywood screen stars, and to endanger the interests of your Public, over which your sneer has ever held such potent powers? Dare you, Diavolo?"

FOR a moment Diavolo wavered. Then Dare know he had won.

"Spare the girl!" commanded the monster, and beautiful Wun Look, suddenly succumbing to the reaction from the tremendous tension of this horrible ordeal, swooned away into blessed unconsciousness.

Diavolo wheeled upon his henchmen. "We are forgetting our duty as hosts!" he exclaimed: "We have forgotten that we the celebrated Harold Dare as our chief guest of honor. We had planned a warm reception for him. Let it proceed!"

The henchmen sprang to the controls of the oscillator. One flicked the switch which set a motor-generator whirring, another turned a rheostat and brought the filament of the large vacuum tube to a cherry glow. Needles flickered and climbed as the oscillator settled to its work.

A feeling of warmth surged through Dare. Had he not realized its terrible significance he would have rejoiced in it. But, as the current rose, Dare's mind was racing. What possible hope might there be for escape before the insidious, penetrating heat had so benumbed his faculties that movement was impossible! Even if he could break the bonds which held him fast, he was outnumbered six to one! Moreover, he was without a weapon, while Diavolo's men were heavily armed. It was useless to try to summon help by shouting, for he knew that any such attempt would only hasten the inevitable end.

The heat was becoming intense. It was relaxing his muscles, and Dare knew that he must act now or never. The face of Diavolo twisted in a cruel smile as he saw the desperation in Dare's eyes.

"And how is the treatment progressing?" he taunted: "Do you feel that after a few more moments you will be able to resume your customary rôle as super-hero of the films?"

"Certainly," replied Dare, still the dauntless hero. "Have you not learned by this time, after all your years of experience in the motion-picture industry that in the end, right always triumphs, and that in the last reel villainy must receive its just punishment?"

"But remember, Harold Dare, this is not a scenario," triumphantly answered the arch-villain. "In your film career the facile pen of the scenario writer has repeatedly again saved you from your richly-deserved fate. This time there will be no such interference. You have foiled me for the last time."

"The end is not yet, Diavolo," said Harold Dare, with a smile that cost him much. The current was finding an easy path and the heat permeated his chest oppressively, making it difficult to breathe. He was becoming very drowsy. His eyelids drooped lower and lower.

From somewhere far off came the sound of a clock striking the seventh hour. Diavolo heard it.

"It is growing late," he exclaimed: "Cannot the thing be hurried?"

He stepped to the controls and advanced the rheostats to the utmost. A fresh surge of heat swept over Dare. Involuntarily he drew a sharp breath. To his surprise, he found that the pain was less when his lungs were full of air. Then, reflecting, he saw the answer. The expansion of his chest forced the electrodes farther apart, making the path of the current longer and hence of higher resistance. He experimented, and found a certain amount of relief in breathing very deeply. Out of the corner of his eye he could see the needle of a meter fluctuate slightly with his movements.

Suddenly a wild hope seized him. With an effort he fought off drowsiness.

"There is one thing that you did not know, Diavolo," he said, in an offhand manner. "You have spoiled one planting of vegetables. You will have to wait several days before you can have your chop suey."

"What do you mean?" Diavolo scowled.

"I mean that the time has passed for the treatment of the plants. In order to get good results, one must treat them regularly. The scheduled time is half an hour past, and already the leaves are drooping. This planting is spoiled."

"You lie, Harold Dare!" cried Diavolo. "It is merely a trick. I see it plainly. You thought that you would entice me to connect the plants into the circuit, so that some of the current would be diverted and you would be relieved." Nevertheless, he stepped over and examined the tiny leaves. They were, indeed, drooping slightly.

"Perhaps it is not yet too late," muttered Diavolo to himself. He picked up a lead from the oscillator and clipped it to the rod which acted as a distributing lead to the plants. The current in the wire leading to Dare dropped slightly. By turning a control Diavolo managed to restore the reading.

Dare took a deep breath. "You see, Diavolo, you will do well to believe me. Even during my last moments I must pursue my lifelong policy of returning good for evil. Therefore I will tell you that you may, perhaps, be able to save the plants if you continue the treatment for thirty-five minutes, instead of the ordinary twenty."

"Yes, my proud hero," snarled Diavolo. "I can promise you that. It will probably take that long to finish the ceremony of welcome which I have planned. After that, my other guest will go with me upstairs, and prepare me a dish of chop suey—under the supervision of my henchmen, who will take good care to record the recipe correctly. It will be an excellent stroke of business, to announce in tomorrow's newspapers:

WUN LOOK CHOP SUEYRIE
MERGED WITH YET UN-HUNG
CHAIN
Ancient Recipe of Mandarins Acquired by
Local Concern!'"

"Dandy Diavolo," said Harold Dare, in a low, resonant voice, which came, it seemed, from the very depths of his chest, "I must admit your cleverness. It was a shrewd scheme, to lure me to the basement of the Wun Look Chop Sueyrie, located at the corner of Hollywood Boulevard and Abalone Street, and here to threaten me with death in the shape of a heavy radio-frequency current passed through my chest. You have applied science to work your fell purposes, and now bid fair to have succeeded. In a few more minutes, you probably will have done away with your hated rival, and Harold Dare will be no more. But be not too sure of yourself until that time comes, Dandy Diavolo. I, too, know something of science. Perhaps there are others beside yourself who are using it as a tool to their own purposes—even your present victim."

"What are you doing?" demanded Diavolo, with a sneer.

"I am sending out invisible waves, too intangible to be grasped by your crude senses, to my unseen millions of fans everywhere. Anyone who is a friend of Harold Dare can save him from a terrible death by coming instantly to the Wun Look Chop Sueyrie, at Hollywood Boulevard and Abalone Street, Hollywood, California."

"Ho!" snorted Diavolo. "Mental telepathy, I suppose. No doubt, while sitting there you mastered the secret of communication between minds without the aid of any intervening apparatus."

"You would not be so calm," said Dare, "if you knew that somewhere in the outside world, someone at this very moment has just heard that I am the prisoner at the Wun Look Chop Sueyrie, Hollywood, and is speeding to the rescue. You doubt it, but I have the faith to believe it."

"You shall soon learn the folly of such over-confidence," retorted Diavolo.

Dare's head was sinking lower and lower upon his chest. The heat was dry and scorching. It seemed that the blood was carrying the stinging heat to every part of the body. His eyes closed. He lay limp.

"Where, now, are your boasted friends?" taunted Diavolo. "Why do they not come to your rescue?"

With a tremendous effort Dare opened his eyes. "Remember, Diavolo, that only in the end can you be sure of the success of your villainous schemes. It is the very last moment, the final reel."

His eyes, turning vaguely toward the door, beheld a strange sight. Diavolo, catching the sudden change of Dare's expression, followed his gaze.

Beneath the door, a flood of intense, bluish-white light poured across the threshold.

Two shadows flickered across its path.

A scuffling of feet, a quick rush, and suddenly the door splintered and fell inward beneath the attack of two brawny policemen. Diavolo and his henchmen were drawing their guns, but too late.

"You are covered," snapped a pre-emptory voice. "Not a move!" In the tremendous glare of a screen floodlight, the great Scott advanced with drawn revolver and disarmed the chief villain and all his yes-men. Behind the powerful arc, a trio of cameramen ground their cameras, and now an assistant stepped forth with microphone in hand, while others adjusted mixers and all other equipment necessary to the recording of this impressive scene for the outside world.

WHILE Scott slashed the bonds that held Harold Dare captive, an announcer was speaking into the microphone which was connected through remote-control equipment to the Dare broadcasting station, WROT, and as the great star rose from the chair, a microphone was thrust into his hand and he was asked: "Won't you say a few words, Mr. Dare, to your vast unseen radio audience—something to reassure them that you are safe at last?"

With a gesture Dare waved aside the microphone. "Friends of the air," he said, "I have first one duty to perform—to my beautiful companion in distress." And while the millions waited, he seized Scott's keen knife and strode to the side of Wun Look. In an instant he had cut the cords and released the maiden from her pitiful plight. Scott drew from his pocket a small vial.

"Here are aromatic spirits of ammonia. They will revive her."

Dare forced a little of the liquid between the lips of the unconscious girl, and before the clicking cameras, beautiful Wun Look slowly opened her almond eyes and blinked.

"Oh, how to come here, Mr. Harold?"

Then to that circle of sound-recording cameras and to that vast radio audience, Harold Dare told his story.

"I was getting pretty warm, with the oscillator passing a heavy current through my chest, and it seemed impossible to escape, unarmed and outnumbered as I was by Diavolo's men. Then I happened to notice that, as I breathed, the current varied with the motion. By a process of 'atiocination I deduced that this effect was due to the greater resistance of the chest when expanded. I was instantly struck with the resemblance of this phenomenon to the action of a microphone. Now, it is well known that any apparatus will act as a microphone if it will vary electrical current in proportion to the physical vibrations that constitute sound. In this case, my chest itself had to act as the diaphragm.

"By using deep chest tones, I caused the voice vibrations to be centered about my chest and give a maximum displacement, thus increasing the change of intensity to a comparatively large variation. Since the vocal vibrations caused the radio-frequency current to vary in exact accordance with the speech, the current in the circuit was modulated with the voice, just as with the carrier wave of a broadcasting station. As I had hoped, someone outside happened to pick up the radiation from the long wires running to the Chinese plants, which acted as antennae projecting the wave into space. I see by the look in his eye that it was Scott who did this, and the truth of my surmise is attested by the way in which the rescue, with its splendid communicative facilities, was carried out. It is he whom you have to thank for this broadcast.

"As for Dandy Diavolo, he is now only too well aware of the truth of the great principle that has been taught by every Dare photoplay in cinema history—namely, that right triumphs over wrong, and villainy is punished. Is it not true, Diavolo?"

"Dare," replied Diavolo, "—and friends of the air, out there at the other end of this great radio hookup—I am beginning to see the truth of the great maxim preached by my lifelong enemy and Nemesis. Undoubtedly the hero business pays better dividends. While Harold Dare is universally honored and acclaimed, my fans only hiss me—it is my lot to make them hate me. Perhaps some day I shall realize my ancient ambition to become the great hero that Harold Dare now is. But until that time, I must ask my admirers to address me—"

"In care of the jailer at the State Penitentiary, Diavolo," interrupted Dare. "This is no time to advertise. When you have learned your lesson and forsaken your evil ways, then you can count on my hearty cooperation. Until then, the minions of the law must guide you in the ways of rectitude. Come, Wun Look. Let us dine on chop suey, made with vegetables raised by the same radio-frequency vibrations which have proved our savior!"

And Harold Dare and the beautiful maiden went forth to a new day, of brighter dreams and a finer chop suey.

# SKYROVER

By LESLIE NORTHERN

***Miko Vran and Rover Tackle a Mighty Touchy Situation on Jupiter in the Face of Desperate Perils!***

THEY had arrived. The rockets had stopped blasting at least a half hour before, and from all about the ship there came an endless series of confused sounds—sounds of men talking, of machines clanking out of the hull of the ship, of strange animals howling and hooting on this strange planet. Miko Vran pulled himself to his full height of four feet and six inches, and uttered a gruff command to the small ugly animal that gazed up at him with anxious eyes.

"Come on, Rover, we're here. We've got to find Pop."

Nobody stopped Miko as he made his way down the passageway. Nobody paid any attention to him as he hopped lightly through the great porthole on to the red soil of Jupiter. Then it seemed

Rover barked furiously, then closed in

that suddenly every one was looking at him. The jaws of the soldiers dropped open, the machinery stopped clanking, and even some of the strange animals quieted down, as if they too knew that something was wrong. One of the soldiers uttered an exclamation of awe:

"Holy sunspots, it's a kid," he cried.

"You've seen kids before," observed Miko in cool tones. He was the only one who seemed hardly impressed by his own feat of stowing away on the troop transport. "I'd like to find Sergeant Vran, please. Sergeant Jamen Vran."

The dog, crouching down on the ground beside Miko, staring in every direction with eyes that seemed about to pop out of their head, burst suddenly into a heartrending howl.

"Quiet, Rover," ordered Miko. "They won't hurt you."

An officer had approached. He gave some curt orders. As abruptly as they had stopped, soldiers and machines swung into motion once more. Having seen to it that everything was going satisfactorily, the officer fixed Miko Vran with a stern eye.

"Have a nice trip here, Sonny?"

Miko Vran was honest and frank. "No, sir. It was kind of monotonous in that closet where I stowed away. And besides I didn't get enough to eat from the other closets."

"That's too bad. You seem to be an intelligent boy, son—"

"My name's Miko Vran."

THE officer smiled again.

"You seem intelligent, Miko. Didn't you know that you were committing a crime by coming here?"

"It wasn't much of a crime," said Miko deprecatingly. Then he grinned, and the officer's sternness relaxed. He couldn't help himself. "I wanted to be with my father."

"That would be Sergeant Jamen Vran?"

"Yes, sir. He left me with my Aunt Lurena when my mother died and he joined the army. But I didn't have a good time with her. I don't think my Aunt Lurena likes boys."

The officer smiled. "She's an old maid?"

"No, sir. But she says she's been disappointed in love. She's had three husbands, sir. And besides, she wants to get married again. I guess I was in the way."

"You're certainly in the way here." The officer sighed. "The fact is I don't know what to do with you. Your case isn't covered in the regulations. So I think I'd better take you to see the General, and let him make the decisions. By the way, what's the pup's name?"

"Rover, sir."

"Rather original, isn't it? Did you think of it all by yourself?"

Miko caught the twinkle in his eye. "Yes, sir. Of course, when I want to be dignified, I call him Skyrover. We've been to Mars and Venus together, and on some of the asteroids. He's a mighty good dog."

"Looks kind of ugly to me."

"Not when you get to know him." Miko was staunch in his defense. "You'd find out he's right good-looking, then."

"He's a mongrel."

"So are you and I, sir. There's no such thing as pure blood."

"*Hmmm.*" The officer scratched his head. "You're no fool, Miko. I wish I could say as much for your pal, Rover."

"He's intelligent, sir. Right now he's scared because of all the strange life forms. He isn't used to them. But he'll get over that after a while."

In fact, Rover seemed already to have gotten over much of his fear. He watched a driller come slithering along, a strange snake-like animal that moved forward with a twisting corkscrew motion, and there was more of interest in his eyes than of fear.

Unexpectedly, a paw shot out at the writhing creature. The next moment, Miko and the officer roared with laughter.

The driller had disappeared into the ground like a flash, and only a small pile of dirt near the smooth hole it had bored was left to indicate where it had gone.

Rover blinked, appealed to Miko with his soft eyes—they were the only part of him that were not ugly—and then pawed feebly at the ground.

Another driller moved toward him, and this time Rover disregarded it. He had learned his lesson.

Miko Vran patted him on the side. "You see, sir? He learns fast."

The officer nodded, and led the way away from the ship. The General's plastic bubble-tent was magnetically anchored to the ground about a half mile away, and he headed straight for that. But when they got close, he stopped, and Miko stopped him. There was a growl in Rover's throat, and his coat was bristling, so Miko put his hand on the dog and made soothing noises. But deep down inside him, Rover continued to growl.

The General was engaged in a strange ceremony. With a medal in his hand, he was facing a huge lobster-like creature that gazed motionlessly at him with many-faceted eyes. He bowed to the right, to the left, then to the right again. He did what seemed to Miko a weirder dance than any the boy had seen on a television screen. Finally, he extended the medal at arm's length, and the lobster-like animal grasped it in one huge claw, and hung it on his carapace.

MIKO realized there was supposed to be a further ceremony after this, he had heard, but it did not come off. For suddenly, every one—the General, the officer who had accompanied Miko, other officers present, even the lobster-like creature—every one froze into position, all their eyes turned in a single direction.

Miko's own eyes turned to see what they were staring at, and clouded over with bewilderment. The thing did not look dangerous or impressive at all. It was simply a large rock, about three feet high, but transparent like no rock he had ever seen. A thousand crystal faces sparkled like the facets of a giant gem. And again, like no rock he had ever seen, the thing was moving slowly, as if alive.

As he gazed, the gemlike quality of the thing disappeared. It became slowly opaque as it came to a stop, so that now it was more like one of the huge boulders Miko had seen on Earth than anything else. Every one relaxed.

The ceremony proceeded. The lobster-like creature went through the same sequence of bows and gyrations previously displayed by the General. Then it withdrew gracefully, and the General entered his tent. Miko and the officer found him there a few moments later, his forehead bespangled with perspiration.

"Oh, it's you, Captain Carvo." Then, for the first time, the General caught a glimpse of Captain Carvo's companions. "What's that? What the devil are these things doing here?"

"They're stowaways, sir. That's what I wanted to speak to you about. I want to know what to do with them."

"Stowaways?" The General made a noise between gritting his teeth and clearing his throat. "By Saturn, I'll show them they can't get away with this. Send them back at once."

"Yes, sir. Shall I dispatch a special transport to take them to Mars?"

"Special transport? Don't be a fool, Carvo. We have no ships to spare."

"That's what I thought, sir. So I'm afraid we're stuck with these two until it's time for the regular return journey, sir."

The General growled to himself. "Blast them to Pluto and back. As if I didn't have troubles enough without them."

"Yes, sir. We had a close call with that silicoido a few minutes ago."

"Did we?" The General laughed bitterly. "Are you sure that was a silicoido?"

"Well—" Captain Carvo hesitated. "It might have been a Ganymedan," he admitted finally.

The General began to pace up and down. "That's the trouble. We don't know the truth, and there's no way of learning it—unless the thing explodes, and I certainly don't want that to happen."

Rover was moving restlessly about the tent, puzzled by the shiny transparent walls. He went up to several objects, sniffed them, then sniffed the General. Miko grabbed him by the neck, and pulled him away. Rover growled.

The General did the same. "Imagine the situation we're in, Carvo. We set out to colonize Jupiter with absolutely no imperialist intentions, no desire to take territory away from any intelligent life-form that now possesses it. We find the whole planet practically uninhabitable because of poisonous creeping fungi—all except the Great Red Spot, where something in the soil prevents them from growing. We take the greatest care to offend none of the creatures that live here—you saw me decorating that lobster just a few minutes ago."

"It wasn't a lobster, sir. It was an intelligent Jovian arthropoid, and quite capable of associating with us on our own level."

"It looked like a lobster, and I can assure you that I didn't relish the job of giving it a medal," growled the General. "At any rate, we treat every one tactfully, and we're in a fair way of making a success of our colony; when what happens?"

"I don't know," said Miko frankly.

BOTH the General and Captain Carvo disregarded him.

"We run into the silicoidos," said the captain.

"We run into the silicoidos." This time there was no doubt about it. The General was grinding his teeth with anger. "Perfectly gentle, amiable creatures—with the one drawback that they're liable to explode at any moment and tear a hole in this planet like one made by a ton of QNQ. And they swarm all over the place."

So that was what the danger had been from the big rock-like thing they had seen a little while before. Miko swallowed a lump in his throat. Just as well he had not known about it, or there was a good chance that he would have been scared right out of those plastic pants of his.

Rover was beginning to move restlessly again. He was trying to sniff all over the tent, and it was all Miko could do to keep a grip on him.

"Our scientists should be able to do something about them."

"Scientists—pooh!" retorted the General. "I've had our engineers investigate the situation, and they report there's nothing we can do. According to them, the silicoidos are mostly silicon dioxide, with no more than faint traces of other elements. So long as they're alive, they're in a condition of unstable equilibrium—just like a Prince Rupert's drop."

"And what may that be, sir?"

"I know!" said Miko eagerly. "We read about them in school. If you drop molten glass into water, it'll solidify quickly into something that looks like a teardrop. It's hard. But if you break off the point, the whole thing explodes into dust."

The General was staring at him open-mouthed. "By the Dipper, the things they teach these kids nowadays."

"Is he right, sir?"

"Yes, blast it. Every time one of those silicoidos turns transparent, there's a good chance it may explode. When it becomes opaque again, the immediate danger is over. But you never know when it'll recur again.

"That sounds like trouble enough. And then along come the Ganymedans. They never had a colony on Jupiter, mind you. They have no right whatever to the place. But they don't want us to have it either. They say we might use it as a military outpost, to attack them later. As if we had any use for their gosh forsaken satellite."

"What did they do, General?" asked Miko, still with a firm grip on Rover.

"What didn't they do? They're mimics, my lad, mimics—carbon creatures like you and me, but plastic and doughy, with the ability to take almost any form they choose. And what do they imitate but those confounded silicoidos."

Miko's face wrinkled up. He was trying to understand.

"The result is, we never know whether we're looking at a real silicoido or a Ganymedan. If we decide the thing is a fake, and we're wrong, we may scare it and make it explode. On the other hand, if we think it's real, and we're wrong—everything comes to a stop, and the Ganymedans have a chance to slaughter us unless we watch carefully."

"Can't you shoot them, General?" asked Miko respectfully.

"A shot would make a silicoido explode. No, son, we're on a spot. If we could tell the difference between them, we'd clean up this place in no time, herd the silicoidos into a pen where they wouldn't hurt any one, and be set to go on with the building we started. It's because we can't do that that you find soldiers here instead of colonists."

"And it's also because of that," put in Captain Carvo, "that no women, children, or dogs are permitted on this planet. The danger's too great."

The General beamed at Miko. He had talked himself out of his bad humor. "What did you say your name was, son?"

"I'm Miko Vran. I'm looking for my father, Sergeant Vran."

"Sergeant Vran?" A grin spread over the General's face. "Well, well! Come with me, lad!"

They found Sergeant Vran.

Miko had never heard such swearing in his life, certainly not from his father. Sergeant Vran's hoarse voice was calling down all the evils known on any planet upon the heads of the dunderheaded fools who had dug a ditch in the wrong place, and upset the plans of the entire expeditionary force on Jupiter.

GENERAL MAURER frowned:

"Sergeant!" he called out sharply.

"Yes, sir."

"That's no way to talk in front of a child!"

"A child, sir?" Sergeant Vran's gray eyes fell upon Miko. A scarlet wave seemed to break over his face. "Miko! What are you doing here?"

"Listening to your profane language," cut in General Maurer. "I think, Sergeant, that from now on you'd better keep a close watch over your vocabulary."

"You always told me," said Miko, "that it wasn't nice to use bad words."

The men were grinning now, and the scarlet color seemed to become more intense, if that were possible, on the Sergeant's face.

"I'm beginning to wonder," said General Maurer coldly, "if my plans weren't a bit hasty. Regulations don't provide, Sergeant, that we take care of your son. I had intended to leave him in your care, until we could ship him back to Mars. But I hardly think you're fit to take charge of so young a child. Perhaps I'd better find a place for him in the guardhouse."

"The guardhouse?" Sergeant Vran's voice was incredulous. "The general surely wouldn't do that, sir! I'll take care of him!"

"And teach him some of your bad language, I suppose?"

Sergeant Vran swallowed. "No, sir," he said feebly. "I'll control myself."

"Good. But if you don't—" General Maurer glared at him, then stalked away, followed by Captain Carvo.

Miko exchanged glances with his father, then stared at the grinning soldiers. Sergeant Vran shook his head as if in a daze. "You—you fellows," he said at last. "You'll have to dig another ditch."

"Sure, Sarge. But you didn't finish telling us what you thought of us."

"Oh, I didn't?" Sergeant Vran's face became grim. Suddenly his foot shot out, and caught his tormentor in the seat of the pants. The man sprawled in the ditch he had been digging.

Vran turned to the others. "Now, how about going right ahead with that ditch?"

They began to dig. Miko yawned. No matter what planet they were on, soldiers seemed to spend most of their time digging ditches. He imagined they would get bored.

Rover was chasing after another strange life-form. Miko ran after him to make sure he didn't get into trouble.

During the next few days, Miko and Rover made the acquaintance of the Jovian ostrich, which was not a bird at all, but a dry land fish with legs. It was Rover who learned first that the so-called ostrich was capable of making an effective gas attack if worried. They also ended up on good terms with Wippler's snipe—a strange bird which made the fables of generations come true by flying backwards—with stoneworms, and with other relatively harmless specimens of Red Spot fauna. Meanwhile, the soldiers, under the expurgated supervision of Sergeant Vran, continued to dig, while the Sergeant hopefully counted the days before the next vessel was due to return to Mars, bearing his son with it.

Except for the silicoidos, and their imitators, there seemed to be no dangerous life-forms. Miko had the doubtful pleasure, one day, of seeing a silicoido explosion from a distance of a couple of miles away. Even at that distance, the roar was so great as to deafen him, and fragments of stone kept him busy dodging for five minutes.

His father gazed at him grimly. "That, Miko, is why kids are forbidden on this planet. And the sooner you get away from here, the better I'll like it."

STRANGELY enough, Miko was not scared. Like all boys, he could accustom himself to danger quickly, especially if he had a dog with him. In one way, perhaps, his attitude was a reflection of that of Rover. The animal, as a matter of fact, regarded the silicodos so casually as to throw the soldiers into a near-panic.

One day, while they had been building a series of plasteel pillboxes, as a change from digging, one of the silicoidos came to life. That is, is assumed the transparent stage, in which an explosion seemed likely to come at any moment. As was natural, every one froze—every one, that is, except Rover.

To Rover, the dangerous silicon creature was no more than just another rock. He stared at it blankly, then followed the trail of a Wippler's snipe, which seemed to lead under where the silicoido was slowly moving.

Sergeant Vran's face was pale with fear, principally for Miko's sake. His lips moved in a manner that indicated he had forgotten the promise he had made to General Maurer. But at first no sound seemed to come from them. Then choking words came from his lips.

"Get that blasted animal out of there," he said.

Miko had tried to move forward, but one of the soldiers held him back. It was Sergeant Vran himself who stepped forward bravely, seized Rover, and with an unspoken prayer in his heart, removed him from the vicinity. The silicoido came to a stop, twinkled for a few seconds, then turned slowly opaque. Several breaths that had been held unconsciously were expelled with loud sighs.

Sergeant Vran studied the little mongrel with distaste.

"I suppose the best thing would be to shoot him," he suggested.

Miko was appalled. He threw his arms about the endangered Rover.

"You can't do that," he protested. "He didn't do anything."

"He almost got us all killed."

"I won't let him do it again."

"All right, take it easy," said Sergeant Vran, somewhat disconcerted by his son's attitude. "I won't hurt him. But I don't see what a bright kid like you wants with such a stupid dog anyway."

"He isn't stupid," declared Miko. "He's really an intelligent dog. How can he help it if the thing looks like a rock to him?"

Sergeant Vran growled to himself, but withdrew the suggestion of harm in Rover in any manner whatever. All the same, from then on, Miko took no chances. On two subsequent occasions when a silicoid creature almost frightened the wits out of everybody, he kept a tight grip on the dog, and did not let go until the danger had passed.

Slowly a week drifted by. On the day when the space vessel was to take him back to Mars, Miko could detect the

relieved look in his father's eye. A few more hours, and he would be out of danger. Also, once those hours were over, Sergeant Vran would let loose in language that would blister both the ears and the pants off the offending privates under his supervision. The need for curbing his tongue had put him under a severe strain this past week.

The vessel was being loaded with shattered equipment being sent back for repairs, with wounded soldiers, with some of the strange Jovian animals, desired for investigation by Earth scientists. Miko roamed around gloomily. Soon would come his own turn. Well, whatever they did, one thing was certain. He would not go back to Aunt Lurena. He would run away again if they tried to make him go back.

Rover was sniffing around uneasily. A driller slithered past, just a few inches from his nose, but he paid no attention. He was too wise by now in the ways of drillers. He was following a trail that led past a group of boulders—probably silicoidos in a temporarily inactive state. Miko moved close to him, ready to grab him in case he showed any desire to stir them up.

BUT when the danger did come, Miko was too slow. He heard a yell from one of the soldiers, and then everybody working to load the ship congealed in his tracks, almost afraid to breathe. A silicoido had made its appearance from off to one side, and was ambling along at a pace that would have been quite respectable in a human being.

Miko's fingers dug into Rover's coat, but in vain. The little mongrel was excited beyond all reason. He tore away, leaving Miko's hands full of short brownish hairs, and leaped straight at the silicoido. A sigh of horror seemed to come from all those who watched. There was no help for it now. The creature was sure to explode.

But it did not. Rover barked furiously, then closed in. The next moment his jaws snapped, and a shrill scream rang through the air.

Pseudopods formed by magic on the surface of the creature, writhed out to clamp about the small figure of the dog. And with that the soldiers sprang into action. One of them brought his atomorifle to his shoulder, but Miko sprang in front of him.

"No, you'll kill Rover," he yelled.

The soldier hesitated for just a moment, then shifted his grip to the muzzle of the weapon, and rushed in swinging. His comrades were also closing in from all directions, so that soon the two struggling animals were lost to sight. The flailing rifles swung again and again and in a matter of seconds, everything was quiet once more.

The soldiers stepped back slowly. Rover stood up, a little uncertainly, and licked his wounds. Miko dropped down beside him.

"Are you hurt, Rover?" His voice was fearful, uncertain. "You're bleeding all over."

"He's all right," one of the soldiers assured him. "I've seen them come out of dogfights looking ten times worse, and live. He's practically untouched."

Rover growled, the sound seeming to come from way down in his throat. On the back of his neck, the hairs were still standing on end.

General Maurer was approaching, at a pace that was a bit too fast for his dignity as a commanding officer.

"What's going on?" he barked. "I heard there was a silicoido—"

Then he caught sight of the dead Ganymedan. "What happened? Who killed him?"

"It was Rover, sir," said Miko. "Of course, the soldiers helped too," he added generously. "But Rover spotted him."

"You mean that this animal can tell the difference between the real silicoidos and those blasted Ganymedans?"

Captain Carvo, who was close at hand, nodded slowly. "It seems he can. And come to think of it, we should have realized the possibility."

"What makes you say that?"

"Because a dog recognizes things by his sense of smell. The Ganymedans are carbon creatures, like us. They emit

volatile compounds that affect the dog's olfactory organs. But the silicoidos aren't organic at all. Hence, ordinarily, no volatile by-products. To Rover, they're just like so many rocks."

"That's right, sir," confirmed Miko. "He never paid any attention to them. That's why I had to watch him so closely. He was apt to scare them by mistake."

General Maurer was breathing hard. "If somebody had only had the sense to send me a dog six months ago," he said. "However, better late than never. I'm going to put Rover on a leash and take him walking till he's sniffed out every blasted Ganymedan around here. And when I do that—I think we're going to have peace. The silicoidos themselves will be easy to handle once we get these fakers out of the way."

CAPTAIN CARVO coughed gently. "But General—"

"Yes, Carvo?"

"Sorry, sir—but what about regulations? Won't we have to send the boy back with his dog? Only members of the armed forces are allowed on Jupiter."

"Blast regulations!" boomed Maurer. "The boy and the dog will be perfectly safe now." He stopped suddenly, scowling at the captain beneath white bushy eyebrows. Slowly his choloric face grew crimson. "Well—well? You've got something on your mind. Out with it, Corvo!"

Captain Corvo spoke, trying, unsuccessfully, to repress his amusement. "That clause about armed forces. You have the power to recruit intelligent life-forms wherever you find them. If you can pin a medal on a lobster—"

The General's face darkened. "Go on, confound it! What are you suggesting?"

"Well, sir, if you recruit Miko and Rover into the army, there would be no violation of regulations. And if you were to promote them to positions corresponding to their importance to the armed forces—you have the power to do that too, sir— I think the men would be forced to treat them with proper respect, sir."

General Maurer's eyes widened, then narrowed. A slow smile spread over his face. "By Saturn, I'll do it. You're right. By all means we must uphold regulations. It'll be Lieutenant Miko Vran and Sergeant Rover. Imagine that —Sergeant Rover."

"Sergeant Skyrover, sir. In official documents, we must use our friend's full name."

"Sergeant Skyrover. Yes, if I can pin a medal on a lobster—" He broke off to chuckle. "Sergeant Skyrover!"

Miko listened with interest. Strangely enough, he was not elated. It would be nice to be a Lieutenant, and to have Rover a Sergeant. It would be nice to escape going back to Mars, and possibly to Aunt Lurena. But poor Sergeant Vran!

Unfortunately, there was no help for it. Sergeant Vran would be forced to continue bridling his tongue. Because if he didn't—

Lieutenant Miko Vran sighed gustily. Somehow, he just couldn't get used to the idea of sending his father to the guardhouse.

NEXT ISSUE'S HALL OF FAME SELECTION

# The Isle of Unreason

By

## EDMOND HAMILTON

AN AMAZING SCIENTIFICTION CLASSIC!

# *This* STARTLING WAR

## *News and Notes from the Science Front*

**MAN-MADE TIDAL WAVES NOW BLAST NAZI SHIPPING**—Six-ton blockbusters able to blast 40-foot-deep craters in ground 110 feet across are now being dropped from RAF bombers over water to destroy Nazi shipping via the tidal waves their explosion creates.

When a shower of the monster bombs was unleashed recently against a Nazi E-boat pen at Boulogne, the only ships out of twenty surviving the waves set up were a landing craft and six small auxiliaries. All the larger vessels in the concrete boat pens were wrecked and the pens themselves severely damaged.

In many instances, 150-foot E-boats have simply vanished after such bombing. The new technique was developed when RAF bombers noticed that the greatest havoc was caused when their bombs missed the pens and fell in the water.

●

***REAL TEETH FOR FLYING TIGERS**—An invention by General Robert Kauch, AAF, and Charles L. Paulus of Wright Field, may take the famed shark's teeth of the Flying Tigers out of the painted-on category and make them real. The idea is simple but wicked. The forward edges of wings and parts of the side of the fuselage are armed with sawtoothed strips of metal, so that a fighter plane can cut an enemy's tail assembly to pieces without suffering damage itself!*

●

**MEDIEVAL WEAPON BROUGHT UP TO DATE**—A modern improvement on a war device that goes back to the Greeks and Persians is the discovery of Major Brooks Walter, AUS. Called a caltrop, it was originally made of four sharp spikes radiating from a center in such a way that one spike would always point upward when the object was dropped to the ground. Man or horse stepping on a caltrop was generally through for the day.

Major Walter's invention has hollow spikes with openings near the ends. Any pneumatic-tired vehicle running over one will be punctured to a fare-thee-well.

●

***ARMOR BUILT INTO PLANE STRUCTURE**—Defense rather than attack is the theme of a patent granted Robert J. Woods of Grand Island, New York, and assigned to Bell Aircraft. Armor on current warplanes is added after the plane is built, is thereby so much extra weight for the plane to carry. Mr. Woods proposes to build armor plate directly into the plane structure as wing beams, sides of fuel tanks and so on, thereby using its structural strength as well as its resistance to attack by enemy missiles.*

●

**WATER SPIDER IS WEIRD CRAFT**—An Orson Wellesish water craft has been developed for the Navy by Los Angeles inventors V. B. Moore and S. P. Tsoneff. It seems to have derived its inspiration from those odd predatory insects that skim about on quiet water surfaces and are known as water-spiders.

The spider's body has an airplane motor and stubby wings, intended for balance, not lift. It stands, with hinged and braced legs, on four small hulls that rest on the water surface, is supposed to be able to cover choppy surfaces without losing cabin equilibrium.

●

***ELECTRIC CHARGES PREVENT ICING**—A new angle of attack on the old problem of ice formation on airplane surfaces is the invention of John D. Larson of Hinsdale, Illinois. Instead of using heat, mechanical cracking or some type of chemical coating, Mr. Larson proposes to impart to the critical icing areas of aircraft a high-voltage, low-amperage electric charge which will repel the deadly water particles before they have a chance to freeze.*

●

**STREAMLINING FLYING BOAT HULLS**—Giving flying boat hulls a better shape for airflight is the intent of James F. Parker of Guantanamo Bay, Cuba. The normal undersurface of a flying boat has a stepped structure, like a hydroplane, to aid its lift from the water. However, the step creates troublesome air drag in flight. Mr. Parker obviates this by hinging the step, so that it can be retracted after the takeoff, making the hull more smoothly streamlined.

●

***NEW TYPE OF GUN MOUNTING**—An English inventor, Josef Vesely of Hoddesdon, has just taken out an American patent on a mounting for machine-guns and light cannon that is intended to give firmer support in firing and at the same time save weight. Essential feature is a big helical spring directed vertically downward, its free end sharply pointed. The idea is to twist this into the ground like a corkscrew, thus giving the weapon greater stability in action.*

# The COSMIC CHAIN

By

## FORD SMITH

*Bombardier John Blakely Solves the Enigma of the Expanding Universe—at His Ordained Moment!*

JUST how he got there, the stranger did not know. All that he could be sure of was that he was here and, obviously, belonged here. For the moment he did not even know his own name, his own identity. Dimly, vaguely, he recalled that this sort of experience had happened to him before. He knew only that he was in a half-drowsy state from which he would awaken to full consciousness in a moment. He would recall the history of this planet and this solar system so far as the inhabitants knew it. But right now—in this breathless split-moment on the borderline of—of something—he was vaguely aware of a past flow of time-space continuity which startled and amazed him. It was like trying to recall fragments of an indistinct dream. He was trembling on the brink of a colossal discovery the immensity of which was appalling. And suddenly it was gone.

He was wide awake. He knew all that his normal brain-pan held in the way of knowledge. He was not mad. His name was Primo Blanc. He was a professor of physics at Tulermo University on the planet Pirood, one of seven worlds in the solar system of Star 64X-942, popularly called Spectros. He was fifty-six years old, and he was standing

As the bombs geysered into flame, John Blakely discovered the answer

on a rostrum facing a classroom of earnest-faced students. More than this, he was delivering a lecture, was in the middle of a sentence, and was perfectly aware of all he had said before, what he was now saying, and what he intended to add.

"—expanding universe. Just what this means, no finite mind can really grasp. We cannot conceive of a time when things were any different, and we cannot imagine what sort of conditions existed prior to the state of matter as we now know it. Geologists, astronomers, and various men of the sciences,

have severally arrived at approximately the same conclusion. Our universe is about three or four hundred million years old."

"This very planet has revealed, from studies of rock formations and the disintegration of certain radiant metals," the lecturer continued, "that it is about the same age as Spectros. Spectroscopic analysis of Spectros and the other stars has revealed that they are approximately the same age. All of the heavenly bodies are in motion—outward.

THE lecturer's voice rose.

"All that we are sure of is that our universe is expanding, glowing, transmitting heat into energy and energy into heat, and constantly puffing outward," he said. "Eventually the universe will have expended its explosive velocity, will have radiated out all of its heat and energy, will have lost its impetus. And then, gentlemen, when that state has been reached, we shall have a black, silent dead universe.

"Perhaps there is a super-colossal universe above us, where the birth, life and death of our universe is simply the momentary explosion of a—a vacuo pistol shot. Just as the explosion of a holiday fusee here in Tulermo which lasts but a second for us may constitute the genesis, life span and death of a microcosm universe that lasts eight hundred million years for creatures contained therein. There is no limit to largeness or smallness of size—only relativity."

Professor Primo Blanç paused and rubbed his seven-fingered hand wearily across his domed forehead. Then he smiled a bit at the body of students.

"For a moment I thought I had a more concrete answer to the riddle of the universe which I could put into words for you, but I'm afraid the thought has eluded me. That will be all for today, gentlemen. Are there any questions?"

"Try to remember, Professor Blanc," pleaded a student in the front row of seats. "What was that elusive thought?"

Professor Blanc smiled again, a trifle uncertainly this time. He wrinkled his brow in intense concentration for a moment and then sadly shook his head.

"I cannot, Toval," he said. "All that comes to me is a queer sort of compound word. It is a name—I think. Tek-Djalex was the word."

"As I see it," said the student, "your description of the universe is a perfect description of the explosion of a holiday fusee, Professor. I think your simile quite apt."

"Perhaps," agreed Professor Blanc. "Tomorrow is the quatro of Juhl. I have been honored this year by being selected to press the central firing stud which ignites the fire fountain display."

The following evening Professor Blanc and his physics class of students attended the festivities in a body. Toval, the student, was standing close beside the professor when the latter, at a given signal, pressed the firing stud for the special fireworks display. Thus, he was the one who caught the professor in his arms as the elderly scientist suffered his heart attack. He it was who heard the strange last words of the dying man.

"A burst of living flame—the fountain," exclaimed Professor Blanc. "Like a miniature universe borning, living and dying all in a breath of time. I—"

He broke off as his face drained of color, and he clutched at his breast as though in great pain. He staggered back, falling into Toval's arms.

"Tek-Djalex," he murmured. "The physicist of the lesser universe. Now I know—*ahhhhhh*. . . ."

* * * * *

John Blakely stirred uneasily. Just how he had got here, for the moment he did not know. Dimly, vaguely, he recalled that this sort of experience had happened to him before, not once, but many times. And yet he could not understand it.

He knew only that he was in a half-drowsy state. Perhaps it was the steady drone of the Vought-Sikorsky Vindicator motors which had lulled him to sleep. Which was no condition for a bombardier to be in while on a raiding expedition and close to coming on the target.

But he seemed to be back in the class-

room on the rostrum in physics hall, addressing a body of students on the expanding universe. Fragments of phrases flitted through his mind—"geologists and astronomers are agreed on approximately the same figures. Our universe is between three and four hundred million years old. . . . All the heavenly bodies are in motion outward . . . We shall reach finally a state of absolute rest . . . present expectancy of another three hundred million years . . . like an explosion of a cosmic fire-cracker—"

AND all the while John Blakely was striving to reach out and grasp a concrete thought on the mystery of the universe that just eluded him. All that came to his mind was the name Primo Blanc. And suddenly he was wide awake, and the pilot's voice was ringing in his ears through the inter-com.

"Coming on target. Take over, Bombardier Blakely."

And the voice of the turret gunner blasting through right afterward.

"A flight of Zeros coming in at three o'clock! See 'em, Lieutenant?"

"Take care of the Zeros, Morton," clipped out the pilot's voice. "Coming on target, Blakely! Do you hear me?"

John Blakely was instantly at himself. That elusive thought had vanished as though it had never been.

"Roger!" he said crisply into his throat mike, arousing himself and making deft adjustments in his bomb bay. "Coming on target, sir. One point to the north, Lieutenant. Steady." Blakely released his stick of bombs. He never noticed the upsurgence of the Vindicator at the sudden loss of weight. He never heard the rattle of the turret gunner's fire as Morton opened up on the diving Zeros. He was leaning forward and his wide-open eyes were following the flight of the bombs earthward to the Jap airbase on the island below.

He saw, not the bombs hitting, but the sudden mushrooming of a cloud of smoke and then the geysering shower of flame and sparks and fragments of debris blasting heavenward. And in that moment the vague and dim thought which had evaded him became clear.

"Primo Blanc!" he cried aloud. "Of course! The scientist of the miniature universe. I had to trip this stick of bombs so that Primo Blanc's universe could exist for a minute of our time—so he could fire some minor explosion of his own in order that a lesser universe could be born for its infinitesimal moment of time. A super galaxy is, in turn, only an explosion in a greater world. Who knows how far the cosmic chain extends downward? Or upward!

"At last I know the answer to the enigma of the expanding universe. At last, I—".

John Blakely never finished his thought, much less his sentence. A stream of machine-gun bullets spat upward through the open bomb bay from a zooming Zero and stitched a neat row of holes the length of his torso.

"Got another Nip, Skipper," shouted the voice of Gunner Morton. "One slipped under our tail, though."

"Are you all right, Blakely?" demanded Lieutenant Tomlin. "Watch out for that duck that got through. Blakely! Come in, Bombardier!"

A blast of gunfire sounded from the tail blister. "Got that yellow son of Nippon," exulted the tail gunner. "All clear, Skipper."

"Crawl down into the bomb bay and check on Blakely," ordered the pilot crisply. "He doesn't answer."

The Vindicator droned on, circling in a tight spiral to head back for base, mission successfully accomplished. In a moment the tail gunner's voice sounded through the inter-com.

"Blakely's gone, fellows," his voice came chokingly. "That last Zero got a lucky hit through the bomb doors."

"Too bad," said the pilot through his teeth. "He paid for himself, though. He got that airbase."

"What was that gibberish he was shouting about the expanding universe, Skipper?" demanded Morton.

"I don't know," replied the lieutenant. "All I can say is that the world has lost a promising physicist—and we have lost an excellent bombardier."

## DARK COMMAND

*(Continued from page 74)*

not know you had a new, improved propulsion field transformer called a Luxton tube. Just now, an instant before the *Aries* broke up, word of it came through to me—on a Mar's-code communication beam."

The old Martian's face seemed to darken.

"Temple, our rebellion is at an end. Your new field drive does not harm the delicate growth cells of our younglings. The old field fanned out in all directions, but the new field clings like a cocoon to the hulls of your cruisers."

"We do have an improved field transformer," Temple gasped. "It generates a powerful beam which cannot be cut by your interceptors."

"Temple, if only I had known about the new field nothing would have happened."

"You would have known," Temple said. "You should have told me about your crippled offspring."

THE old Martian leader shook his head.

"I wanted to tell you, Temple," Lig Narun replied. "But I was overruled and had to abide by the decision of the Council. You see, we had a conference, Temple, all of the Martian chieftains. We did not know you had a new field drive ready to install. We only knew that the old drive was deadly and that Earthlings can be very stubborn. All of your colonization dreams, Temple—would your Admiralty have abandoned them without a struggle, even to spare our young?"

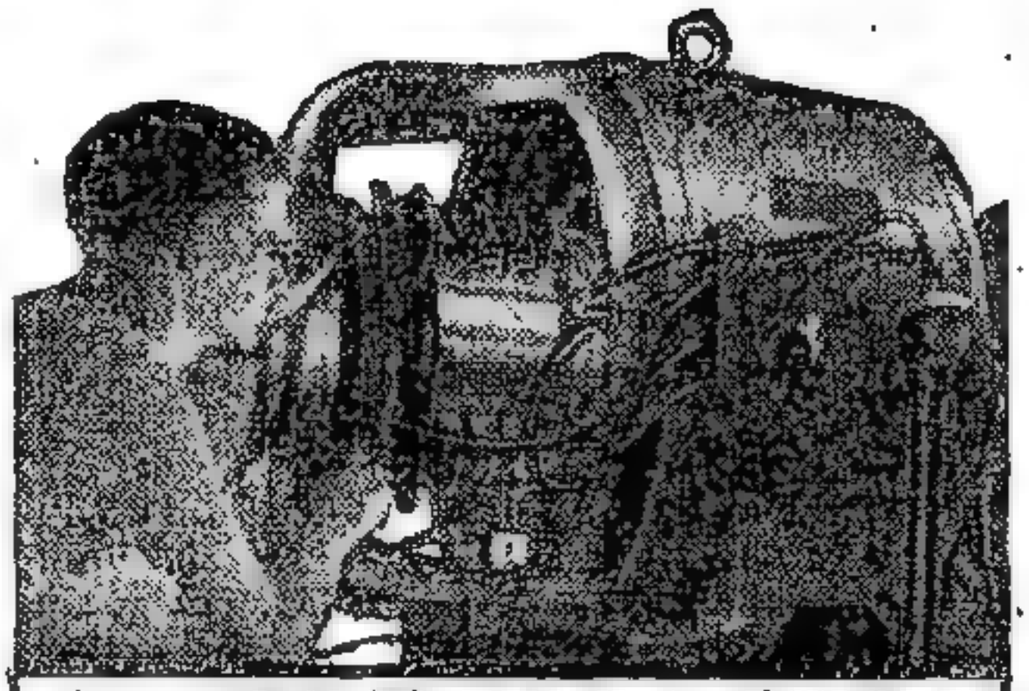
"Perhaps not," admitted Temple.

"Temple, your ships are all driven by propulsion fields, without ships you could not remain on Mars. Your survival depends on keeping the space

[*Turn page*]

NEXT ISSUE

# CAPTAIN FUTURE IN RED SUN OF DANGER

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lanes open. I wanted to go to you, but the Council decided to strike without warning."

"I understand," Temple choked.

"Temple, I should have opposed the Council. You are a man of good will. Even had you not possessed a new field drive you would have fought for us. You would have fought for our offspring. You would have been on our side."

"Yes, I think so," Temple said slowly. "I stand by my friends."

For an instant Lig Narun looked at Temple. Something, understanding, infinitely sad, seemed to pass between them. They were comrades once more.

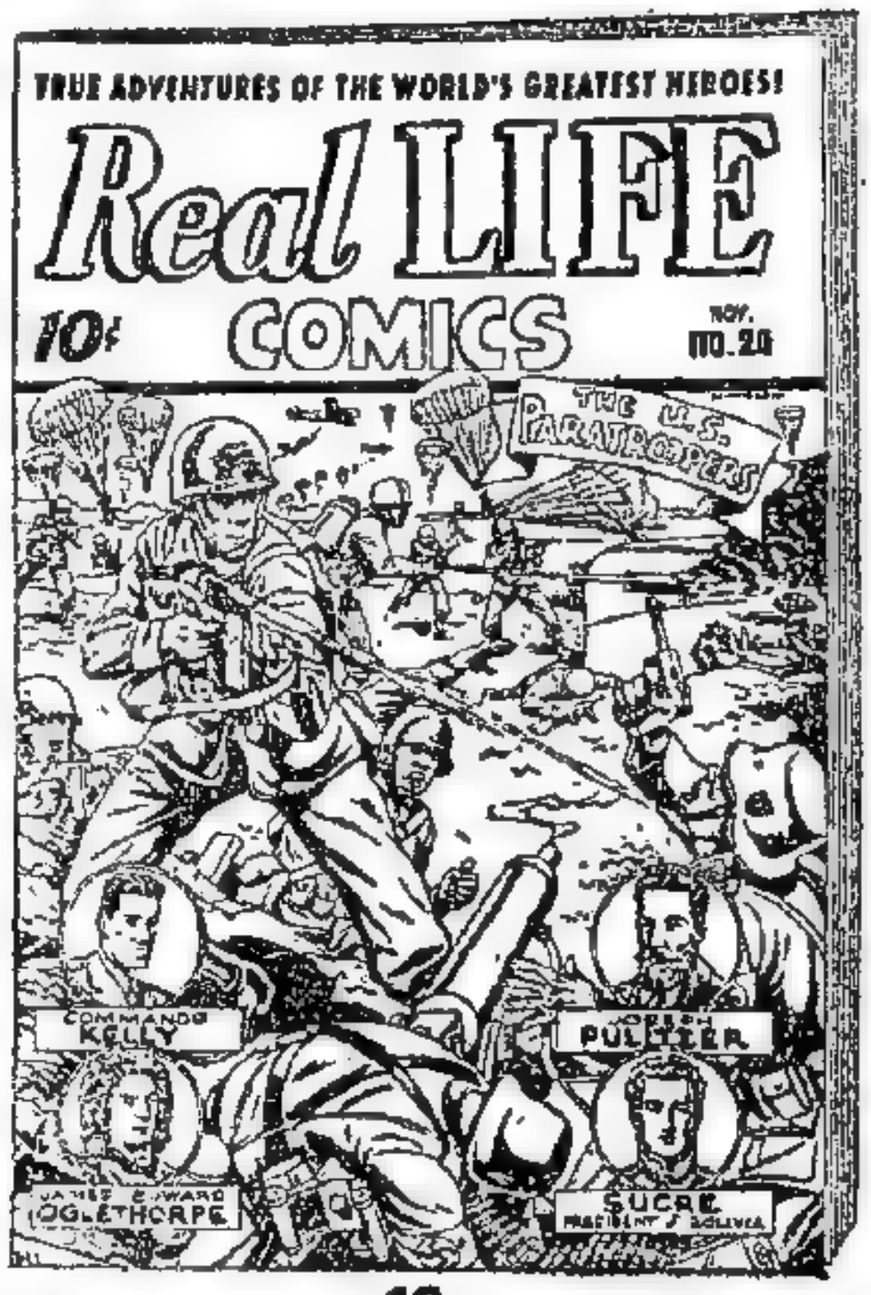
Then—Temple's arm went out and around the old Martian's shoulder.

"Well, Lig Narun," he said. "We've got to get back to the ship if I'm going to make out that report for the Admiralty."

"A report, Temple?"

"Yes, it's customary. But it's surprising how many things you can leave out of an Admiralty report without getting into hot water with the Colonial Office. It really is, Lig Narun."


# Approved by Parents and Teachers

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# REVIEW OF THE SCIENCE FICTION FAN PUBLICATIONS

By

SERGEANT SATURN

THE dam has bursted! Apparently procuring the necessary paper out of some distant galaxy, the publishers of these unique magazines have been increasing so rapidly that, except in the cases of the more pretentious jobs, ye olde Sarge is going to have to limit himself to acknowledgments.

Before getting down to cases, I want to recommend heartily the beautifully mounted and

lithographed portfolio of ten drawings by the late, great Wallace Smith, put out by Ronald Clyne and a few associates of the Los Angeles LASFS club who bore the cost of the printing. These drawings are among the finest works of their type ever seen by the Sarge. THE ACOLYTE, 1104 South Georgia Street, Los Angeles 15, California. Editors, Francis T. Laney, Samuel D. Russell. Quarterly, 15c per copy, four issues 50c.

Sarge is glad to be able to tell you that this ambitious fanzine is back with a bang after its threatened suspension with a 30-page No. 7 issue exclusive of covers, packed with stories, poems and features by such well-known names as Anthony Boucher, Duane Rimel, H. P. Lovecraft, Clark Ashton Smith, E. Hoffman Price and many others. Cover by Maliano and endpiece by John Giunta up to snuff.

**CENTAURI, 515 Ocean Avenue, Pismo Beach, California. Editor, Andy Anderson. Quarterly, 10c per copy, three issues 25c.**

Another well-printed issue with featured story by the editor, a pair of archers on the cover, by Ronald Clyne, and Keith Buchanan, Francis T. Laney, James Russell Gray, Harry Warner Jr., and other stand-bys inside. Anderson's *No Greater Warrior* an obvious but reasonably effective hunk of irony, but liked rather better the elaborately illustrated Atlantean parable called *Intolerance* by E. T. Beaumont, Wilma Bellingham and Charles McNutt that accompanied the issue.

**CHANTICLEER, second issue. 25 Poplar, Battle Creek, Michigan. Editor, Walt Liebscher. 15c per copy.**

Cover, illustrations and cleverly typed borders by Jack Wiedenbeck dominated the second issue of this bright new magazine of 30 pages, whose interior seemed more dedicated to wise-cracks than to fanzimania. However, the book review sections were excellent, and congratulations to all concerned.

**DIABLERIE, 1299 California Street, San Francisco 9, California. Editor, Bill Watson. Bi-monthly, Price, 5c.**

Interesting 28 pages containing a tribute to author Robert Ervin Howard by E. Hoffman Price, good work by Lou Goldstone, Shirley Chapper and Graph Waldeyer, as well as top-notch art work by R. Clyne, J. Wiedenbeck and Maliano. The cover is this issue's

[*Turn page*]


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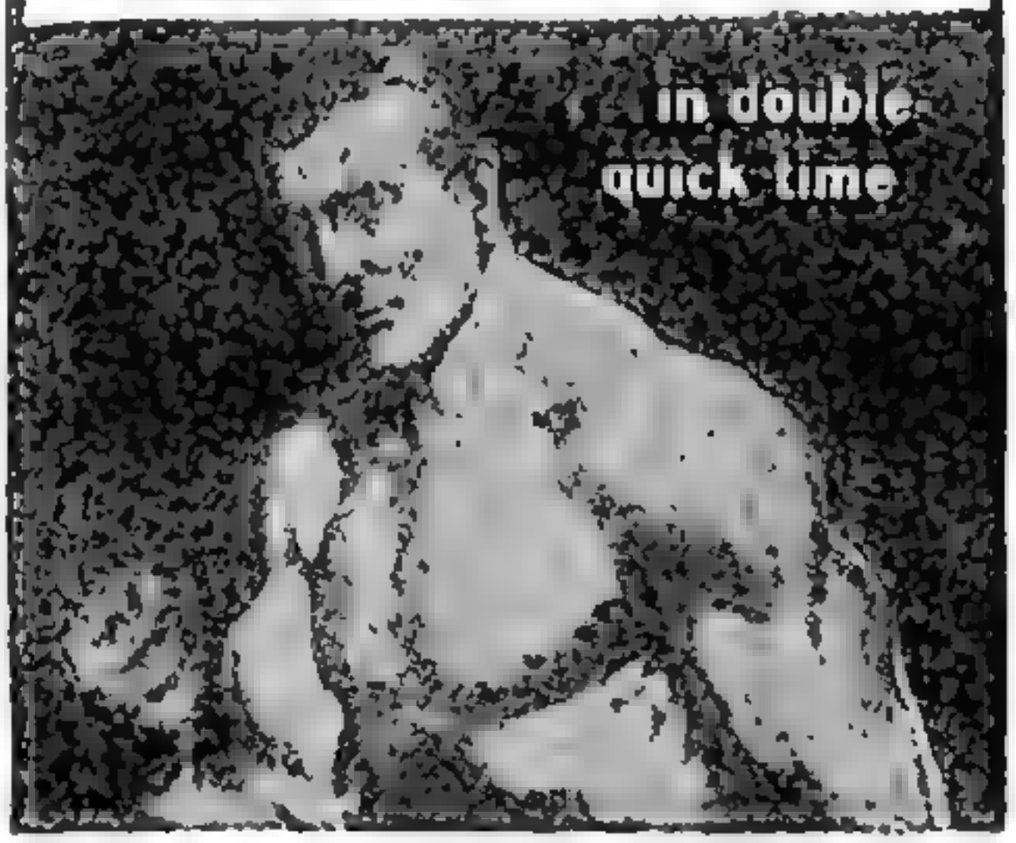

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weakest feature. Certainly a fat nickel's worth for fantafana.

**EREBUS, c/o Shaw, 1301 State, Schenectady 4, New York. Editor, Len Marlow, No. 4. No price listed.**

Behind the somewhat appalling smile on Editor Marlow's cover nude, this issue contains a story by R. L. Dubois, poetry by Marian Crane and a blast at the future of fantasy pulps by Ray Karden on 18 heavy yellow pages. Printing and contents just fair this time.

**LUNA PONO, 413 East Park Avenue, Savannah, Georgia. Editor, Frederick E. Warth, Jr. Fifth issue. Price, 5c.**

Imaginative little 8-page job with an amateur look that suggests its editor and his collegues are still in the male bobby-socks era. But more power to them for getting the magazine out. An article on hypnosis by William Farrior, Jr., is about what you'd expect. I liked the shorter items better.

**NUZ FROM HOME, 1443 4th Avenue, South Fargo, North Dakota. Editor, Walter Dunkelberger. Monthly. Free to servicemen for a letter.**

The Sarge is still a little baffled as to how this general news letter to Servicemen gets into the fanzine review section every issue, but it does have a good bit of scientifiction fan chatter in its gossip columns. For what it is, a homey chatty, frequently amusing little release to lads and ladies in the armed forces, it is an excellent job. Again, put a price on it, Walter, and give civilians a break.

**SHANGRI-L'AFFAIRS, LASFS Clubroom, 637½ South Bixel Street, Los Angeles 14, California. Editor, Charles Burbee. Monthly magazine, issues 14, 15 & 16. No price listed.**

This twelve-times-a-year annual of the antics of the Los Angeles fans, including Lora Crozetti, Morojo, Frank Robinson, Ron Clyne, Charles McNutt and the others burst forth with added pages and a cover in its June and July issues. The latter is interesting in that Don Bratton announces the beginning of, and requests help in making a complete catalogue file or scientifiction. A large order, but if the gangs rally round, it should be really something worthwhile.

**TELLUS, 475-A Eagle Avenue, Alameda, California. Jack Riggs, editor. Eight issues per year. Price, 5c per copy.**

More Southern California capers with Riggs, James R. Gray and Leslie A. sharing its 16-odd pages with drawings by Joe and E. J. Wyers. Wyers' what-is-it on page 12 makes that the oddest in the entire magazine. Gaggy.

**VENUS, LASFS Clubhouse, 637½ South Bixel Street, Los Angeles, California, Editor, Lora Crozetti. First issue, published irregularly. No price listed.**

There is no keeping these Southern California fantods down. Lora Crozetti, abetted by Glen Daniels has here come up with a new 32-page-plus-jacket job on very fancy multi-colored paper loaded with fiction by such headliners as Leigh Brackett, Bob Tucker and the editors, poetry by Lynn Starr and fantanudes by Joe, Lora Crozetti and Karl Welch. This month's star entry in fanzines. Congratulations, Lora.

**VOM, Box 6475 Metro Station, Los Angeles 14, California. Published by Snafucius Publications. 15c per copy, seven for $1. Issued more or less monthly.**

The *Variety* of fanzines is still indulging in lengthy reader correspondence couched in language to spin a Winchell in his cot. The No. 35 cover is one of the best, and, for its fans, the magazine is still printed on legal outsize paper and is packed with news they like to hear.

**XENON, 1217 Broadway, Imperial, Nebraska. Second issue. Editor, Gordon Rouze. Price, 25c for three issues, published irregularly.**

Contains a story by James R. Gray, scientification reviews by John Blackstone and an interesting article by Dorothy C. Walter on "Lovecraft and Benefit Street," interlarded with some sad Kruegerian humor and even sadder art. But on the whole a

lively and needed magazine for mid-west scientifantods.

Old Sarge wishes to acknowledge gratefully the following letters and mimeographed sheets for which there is no reviewing space in this magazine. He'll try to have room for all of them next time.

BLACK STAR, issues No. 5 and No. 6, 84 Baker Avenue, Dover, New Jersey, Editor, Joe Kennedy. Published monthly. Free to SISFA members.

COSMIC DUST, 1207 East Henry Street, Savannah, Georgia. Editor, Walt Kessel. Published irregularly, price 5c per copy.

FANEWS WEEKLY, 1443 4th Avenue, South Fargo, South Dakota. Editor, Walter Dunkelberger. Now on its second year. 2c per copy, 13 for 25c.

FANTASY NEWS, Box 7316, Baltimore 27, Maryland. Editor, Wi.l Sykora. Rates, 3 issues 10c, 8 issues 25c; 32 issues, $1. No stamps. Published tri-weekly.

FANTASY FICTION FIELD, 6401 24th Avenue, Brooklyn, New York. Editor, Julius Unger. Published weekly. 5c per copy, 6 for 25c. Still the eastern stand-bye.

FANTASY TIMES, 446 Jelliff Avenue, Newark, New Jersey. Editor, Sam Moskowitz. Monthly, 5c per copy.

PHAN, 1299 California Street, San Francisco 9, California. Bill Watson Editor. Published weekly. 2c per copy, 6 for 10c.

STELLAR, 2090 East Tremont Avenue, New York 62, New York. Austin Hamel, editor. Published monthly. 5c per copy, 6 for 25c.

Also received was something called a COSMIC BOOKLET featuring a James V. Taurasi opus entitled *The Magician of Space*, a semi-literate story of weird doings on an earth-bound spaceship. He promises more of same in the near future.

Well, that's the list, and we haven't even room to cover the newsletters as usual. The old Sarge has barely time to lock his ship up tight and take off on the Zeno patrol, which cant' wait.

Get your fanzines in early for review in our next issue, and thanks a lot, all of you. The spirit is always willing, even if occasionally your mimeograph machines seem a trifle weak. Keep 'em coming!

—SERGEANT SATURN.


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# THE ETHER VIBRATES

*(Continued from page 8)*

(is that the original filo?) and Marchioni for a short.

So I'll leave you with a pat on the back, binoculars trained on the next ish that looks really good and the optomistic hope that we'll get a good cover. —*68 Madsbury Rd., Durham, N. H.*

Who's being literal, Kiwi Perry, you or Bergey? Those bems are black enough to be hard to find on a dark night on Mars. Besides, they should have a ruby tinge, if you know your Mars at all. It's the red planet, isn't it? Send along the fanzines and give us a crack at *your* work. It will be a pleasure.

## KINDER TREATMENT
### By Austin Hamel

I have thoroughly perused the latest STARTLING STORIES, and here is my verdict. (HHArummph!)

Feature story by Leigh Brackett was far above average. Leigh's dramatic writing is different from the general run-on-the-mill type. The most likable character in the story was Kyra. Leigh did use plenty of Blood 'n thunder though! On every page the hero was either knocked out, gassed, or knifed. It tended to drag out a little in parts, but it still maintained interest throughout the whole yarn.

Donnell did an excellent job of illustrating it. Oh, for the original of the illustration on page 13! Y'know, this is either the first time, or one of the very rare times when a woman illustrated a woman's story in a STF magazine!

As to the short stories. They were better than many since SS first started. They have set a new standard with this issue. First of course was the great Hall of Fame story by D. D. Sharp. This, of course was better than the novel. Secondly was the last story to appear, the Invisible Vandals. It was fair through the yarn, but the end cinched it! Very good Charles Stoddard. The other two were very good also. In all, an above average issue. The art work, letter column and the stories were all good.

But the cover. A toothpaste advertisement. See, everybody except the bald-headed character on the lower right shows his teeth. The repulsive gent on the lower left has just tasted that potent liquid, *Xeno*. He is showing his opinion by facial contortion. Ah! but the red-headed, in fact red-bodied gent at the upper right has just tasted a more fiery liquid. XZVM. The dame is losing her false teeth and struggles to get them back in place. Meanwhile the hero is playing with his rattle, and is forcing a smile for the camera.

The blatt column was good. Kennedy was very good! I agree with his condensed novels. A marked improvement. But Joe can really write better. And draw better too. (Joe, the knife is too high. Its starting to tickle!) Other good letters by Mickey, Walker, Sehnert, Pace, and Gray. Krueger was good too

Ahhhh! The next issue! The long awaited sequel to that swell yarn, "City of Glass!" I can just picture it now, the next issue that is, an intricate robot cover, the inside illustrations done by Wesso, who illustrated "The City of Glass." The novel itself running no less than 115 pages. So what if there are only 114¼. Stick the last page on the back cover!

Seriously STARTLING STORIES is picking up beautifully after a sharp rut. It was doing swell until Winter, and even then the main novels were good, but you seemed to be forgetting about the rest of the magazine! Ah, but it looks like we are really picking up.

By the way. How many of you heard the recent batch of Scifantasy programs over the air. Some are good!

Also there are many Scifantasy movies, but most are pretty awful. Now that Captain Future is no more, is it possible that we will be seeing him in SS? Who knows? Hoping for a good next-issue.—*2090 East Tremont Ave., New York 62, N. Y.*

Glad you liked "Shadow Over Mars" and Donnell's illustrations, as well as the short stories—let's throw an onion to Perry for his snobbery in the letter above yours. But some of your pee-lots ought to be able to find another target for snide cracks beyond poor Bergey. That gal was really a triple-plated Ganymedean apian honey, as any red-blooded fool could plainly see.

## MISTAKEN IDENTITY
### By E. Everett Evans, President NFFF

Dear Sarge: Just received my copy of STARTLING from the newsstand, and was agreeably surprised to see that you liked the little concept of yourself that appeared in my FAPAzine, "A Tale of the 'Evans.'"

However, I am sorry to note that you gave me credit for drawing it, when it was done by that really fine Fan artist, Jack Wiedenbeck. I, myself, cannot draw at all.

Would it be too much trouble for you to make that correction in your next issue. It is perhaps a minor matter, but we here at Sian Shack, as well as the balance of active Fandom, feel that Jack is a really fine artist, that I'd like to see him have the credit that belongs to him.

He is now drawing a cover for a new fanzine that I'm planning to put out soon, and I'll see that you get a copy. Wiedenbeck also does the Air-brush covers for NOVA and *EN GARDE*, and most of the other illustrations.

Brackett's story was excellent. The gal really can write and has a distinctive style all her own. The rest of the issue was quite better than par.

How about "The Nth Man" sometimes, in your Hall of Fame. I still think it the best of the "big man" stories.

Wishing you continued success and very best of luck!

Blame it on the fact that Wartears, the lug, put a large chunk of unvaporized Uranian rock salt in the Comet refrigerator, side by side with the ready-to-imbide stock of Xeno. The effects were terrific, and when we came out of the ether, we had put the old spaceship right through the middle of a couple of 9th-magnitude twin suns and fused our airlock gaskets.

But we have called attention to the error twice now, and, with all due apologies to excellent artist Jack Wiedenbeck, think that's enough. Particularly as the drawing in question was so supremely unflattering. We haven't yet doped out what that stuff is growing out of our head, if you can call it a head. But, oh well—and thanks for the amiable criticism contained in the rest of your letter, Kiwi Evans.

## CRIT CRACKS
### By Gene Hunter, S2/2c, USNR

Dear Sarge: It's been a good year or more since I served a hitch aboard the good ship STARTLING STORIES, and I've barely time to make this voyage. By the time you receive this I will be gone from this beautiful convalescent hospital on the shores of Santa Cruz, California, and Klono only knows where I'll be when this is printed.

The current S. S. is undoubtedly the best this year. Bergey's cover is typical SS-TWS work, only fair. This is the third such painting this year, Sarge. A change will be welcome. Give Bergey a rating of 2.5, and while you're at it, a vacation as well.

As for the interior work, it was good, but not as fine as the preceding two 1944 issues. Spring saw your art average a nice 3.0, Summer 2.928, with only 2.642 for this, the Fall issue. I take it Donnell did the illustrations for the novel. If so, I'm glad to see she has discarded the Finlay technique. Donnell averages 3.0 as compared to 3.666 for last time, Kramer and Morey both make 2.5, and Marchioni a 2.0 as against 1.0 for summer. I missed Finlay this issue, Sarge. Hint, hint.

*SHADOW OVER MARS*—*Leigh Brackett*—4.0 Excellent! A minor classic, Leigh, and I believe it's the best story of yours that I've read. STARTLING STORIES can well be proud to have presented this novel.

In the letter column of another magazine, one Alan Mannion, one of the better letter-hacks, continually writes that he *lives* each story; that he is there fighting beside the hero every minute. Sadly, I can't say the same. It takes an author who writes about *people* rather than *characters* to hold my attention. But I can honestly say that I lived SHADOW OVER MARS. I admired Rick Urquhart, yet I pitied him more. I loved Mayo McCall, and I hated Fallon and Storm intensely. When Kyra died I was sorry, for she was a friend, not just a colorless character moving across a printed page. The New Town, with its vice and brawling and burlesque shows was a *real* city, not just a figment of Brackett's imagination. It could have been the foreign quarter of any city here in America. You thought of Los Angeles' Main Street, didn't you Leigh.

Again, my congratulations, Miss Brackett, for an excellent story.

THE COSMIC DOODLER—Carl Jacobi—3.0. This is one of the author's few really good yarns. Nicely told. Keep it up.

THE DAY OF THE BEAST—D. D. Sharp—2.5. Only average, following the usual trend with your "Hall of Fame" stories. BEYOND THE SINGING FLAME last issue was the exception to the rule.

THE MAD DOMNEYS—Verne Chute—2.5. Amusing little fantasy, but nothing new.

THE INVISIBLE VANDALS—Charles Stoddard—2.0. Mediocre. Just another story with a slightly tricky ending, as far as I'm concerned. No credit to the magazine—in fact it lowered its rating.

And so we find the Fall issue the best so far in this year. Spring averaged 2.5, Summer 2.704, and Fall 2.734. Not a great deal better than Summer, to be sure, but an improvement. Now break the 3.0 mark with the Winter number, and I'll say STARTLING STORIES is ready to take its place among the leading magazines once more.

I found few letters interesting in THE ETHER VIBRATES. MICKEY was O. K., but a bit too idealistic for me. I admired Sehnert's stand, and agree with him entirely about the Hall of Fame series. I've said it before privately, and I'll say it again openly. Weinbaum's van Manderpootz series was little better than average science-fiction. There. I've said it. What fandom in general is going to think I'm sure I don't know, but the fact remains that Weinbaum did *not* do his best work for the old WONDER STORIES.

A very small fraction of the reprints that you call classics live up to that name. Like most of the short stories of the era in which they were first printed, they cannot stand up beside most of the science-fiction published today. The same is not true about the longer stories. WONDER STORIES novels, novelettes, and serials were, for the most part, excellent. Those are the yarns that should be hailed in your Hall of Fame department, instead of the average and mediocre stories such as THE DAY OF THE BEAST, Van Manderpootz, etc.

Print some of the old WONDER STORIES and SCIENCE WONDER STORIES novels. Print them as serials, if need be, but *print* them. Don't argue that STARTLING is a quarterly and that it is not advisable to run serials, for a serial appeared in the first issues of CAPTAIN FUTURE—I can't recall the title, but it proved to be immensely popular there, and ironically enough, it wasn't well liked originally. If the newer fans could read such stories as THE TIME STREAM and THE GREEN MAN OF GRAYPEC, to mention only two, they would form a different opinion of yesterday's science-fiction.

**It is evident to the old Sarge that Seaman Hunter is a critic to the manner born—not that critics, even in the farthest-flung regions of space know either manner or manners, any more than they do on Earth. Just how he manages to reduce something as intangible as his opinions of someone else's stories to such a mathematical base is beyond this weary old space traveler's abilities, mathematical or otherwise, to fathom.**

**But at any rate, he has opinions and states them thoughtfully and sincerely—not just sounding off as so many of the correspondents to bre'er Saturn seem to delight in doing. We'll take a slam over the head from this peelot ahead of the raves of some other kiwis we know!**

[*Turn page*]


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## POOR "MR. DONNEL"

### By Ken Harmon

Dear Sarge: I write you to express my delight over two things in SS. The first, is the finding of a new artist. *Donnel is good.* He is different from Finley and Paul, but is as good as either. Oh for a cover by him.

The other is for the first appearance of Leigh Brackett in this mag. "Shadow Over Mars" is a classic in the true sense of the word. Although not another "Moon Pool," it is way up there. It is the best story to appear in SS this year.

Although the cover was the best this year (good issue, what) I think that Bergey needs a rest. The best interior was Donnel on page 13, second Donnel on page 11, then Donnel on page 17. The rest were poor. Why only three illustrations per novel?

I close with one note of happiness. After seeing your picture I think that you are not as bad as I thought. Not bad—not bad at all. . . . Sincerely.—*627 Channing, Palo Alto, Calif*

Ho hum. I don't suppose it will be of any use, since we have been howling at your unobservant Neptunian pythons for many long Jupiter moons to no avail, but your favorite illustrator's name is not "D. Donnel" a he, but Dorothy Donnell, a she and a darned competent one at that.

Otherwise, thanks for the nice cracks—about la Brackett and the others. As to the illustration limit, these days the paper shortage makes it imperative. Otherwise, we'd have to cut out large hunks of novel, which might or might not cause other readers to howl like Mercurian coyotes.

## GAL PEE-LOT'S OPINION

### By Joy Stillman

Dear Sarge: This is the second missive I am tossing your way, and since the first one, I am an infinitely wiser girl and will not follow the old style of complaining about each and every story. The only story I would like to comment about is the one by Leigh Brackett. Miss Brackett has a distinctively different way of writing than any of the other writers in the magazine. Her choice of words and her descriptions are beautiful. I believe Miss Brackett would be very successful writing poetry. SHADOW OVER MARS is one of the best stories I've ever read in this magazine.

Earle K. Bergey evidently didn't read Miss Brackett's story, or at least not very carefully. In the story, Mayo was wearing a coverall that covered her up to the neck. As you can see by the cover, Mayo certainly is not wearing a coverall.

Sarge, the paper shortage is terrible. Every once in a while I make the rounds of the various stationery stores in search of certain well-known magazines . . . they are not there. I am told firmly they have all been sold. I have already missed several issues of all three science fiction companion magazines. The funny part of it all is, Sarge, I have yet to meet one of these buyers. In fact I have never met one science fiction fan yet, and I have it on good authority that gremlins do not read STARTLING STORIES.

I am writing to you because in the last issue there were no letters from gal pee-lots. I know you are not prejudiced against girls so I guessed that none wrote in. What would science fiction do without that feminine touch?—*65 Central Park West, New York, N. Y.*

You're right, Joy, the old Sarge is anything but prejudiced against girls pee-lots—in fact, the prejudice seems to run the other way. Maybe some of the drawings of old SS the male readers have been sending in have been scaring you lady bugs away—frankly, they'd scare a Venusian atheuro-crocodile right out of his seven-year skin. Why don't some of you gal pee-lots give us a sample of what you think we look like—and make it purty?

But thanks for the letter, and if you'll read the notices scattered through SS and its companion, TWS, you'll see that it is advisable to place your orders for the books in advance at

your nearest newsstand. Paper rationing has limited sadly the number of copies we can print.

## KENNEDYTHON

### By Joe Kennedy

Dear Sarge: Leigh Brackett's novel in the Fall STARTLING proved exceptionally readable, but I've seen her do better. There's still no modern pulpist who can handle an adventure story as she does, though. Take another look at the way those chapters are numbered, O ye Linotypists! Tsk.

As for the drawing of the Sarge on page 6, the style and signature belong to the skillful fan artist, Jack Wiedenbeck, not E. Everett Evans, whom you gave the credit to. Another tsk. By the way, Sarge, thanx for publishing my cartoon of you in TWS. 'Twas rather hacky, but I admittedly got a kick out of seeing it in print.

Fanzine reviews continue to intrigue. I like VOM and NOVA, too. Reviews of Cosmic Circle Club propaganda faintly humorous. Thanx again for mentioning QX THE CARDZINE. I'm planning a full-size FMZ to be known as VAMPIRE, and will send you a copy when it appears.

Armed with satch-ray and mold-gun, I once again descend into the namless fungoid-lined caverns of THE ETHER VIBRATES. . . .

John Cunningham's comments were one of the bright spots this trip, but (quote) I suggest that you pick shorter Hall of Fame Classics (unquote). . . . Cunningham, thou art a traitor to the cause!

Rusty Gray came through with a nicely expressed Ethergram as usual, and Ken Krueger's exuberant remark place him high on this issue's hit parade. If you need any help shooting some of those artists, Ken, just call on me. I keep a tommy-gun stored in my closet for such purposes. (To whomever is reading this: You may laugh now.)

Benson Perry and Mart Mickey deserve a few assorted bravos for their neat letters. As for the latter—yes, world unity is desirable, but, frankly, it will take more than a handful of science-fiction pulps to bring this about.

In answer to Tom Pace:

Sure thing, Tom. I was an *American Boy* STFollower. Dragged out some old copies today and rediscovered some fine Carl H. Claudy tales . . . "Terror by Temperature" . . . "Holes—Holes—Holes" . . . "Tongue of Beast" . . . a superb novel. "Return to Mars" . . . also a top-notch short, "Rocket to the Sun," by Peter van Dresser, who edited the official publication of the American Rocket Society,

[Turn page]

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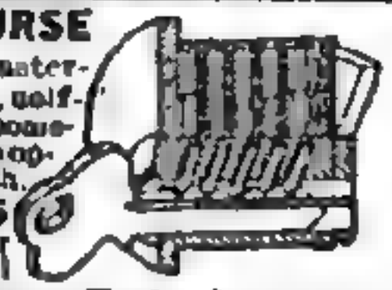

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ASTRONAUTICS. . . . Most of these stories were coupled with terrific rocket pix by William Heaslip.

Then there was a splendid article called "Let's Leave Earth," by van Dresser and Franklin M. Rock. It described an imaginary space flight in 1979 to a man-made steel satelite 709 miles from Earth.

Some wide awake publisher (ahem!) should arrange to reprint a selection of this excellent material in some form or other. It is *not* juvenile.

Austin Hamel, who had a letter in the Fall issue, is apparently a Claudy fan. I visited him several weeks ago and noticed a nice set of "Alan Kane" books on his shelf. What about it, Aust?

Sgt. Strn is mrvlus at wrtng hdngs & ltrs. . . . Simplified grammar there. Sometimes he playfully uses the same letter blurb twice, thinking nobody will notice—but fen are all-seeing, all-knowing, etc.

A plea, noble sergeant, for a speck of publicity to an up-and-coming fanclub. 'Tis the "Society for the Improvement of Science-Fiction in America," a correspondence club. Main interest of the SISFA is to introduce SF readers to active fandom. If anybody in the audience is interested in joining drop a note to the president, Henry Elsner, Jr., 13618 Cedar Grove, Detroit 5, Mich. Au Revoir!—*84 Baker Avenue, Dover, N. J.*

We'd better handle your questions, cracks and other remarks in order, Kiwi Kennedy. First, about those two chapter sevens in "Shadow over Mars." Well, there isn't much we can say except that, as most fantods know, seven is a cosmically lucky number, so why blame anyone for using it twice? Maybe the linotypist or editor in question had his mind on last night's interstellar robot dice game.

Credit for last issue's Sarge Saturn cartoon has already been rearranged in this department, though why credit (!) is beyond our Xeno-warped faculties. And when VAMPIRE comes out, send it around for the fanzine reviews. We'll guarantee to suck a little blood out of it—if it contains any corpuscles.

On those "American Boy" yarns you put on the ether rave for, we'll look it up and see what can be done—but no promises until the war is over. Thanks for the suggestions, any way. You will find we gave the SISFA a mention in the fanzine review department. So sit back and await results, if any.

## CHAD ROW
### By Chad Oliver

Dear Sarge: The good ship STARTLING STORIES, after sailing through the intricate channels of Uncle Samuel's postal service, finally docked at Ye Locale Bookshoppe, at which point it was avidly snatched up by yours truly. Having consumed and digested the Fall cargo, the One-man Gallup Poll has decided to grant you the rather debatable honor of a report on same. Yeah, Sarge—Xeno is the only way out!

First off, suppose we dissect the lead novel. "Shadow Over Mars" is one of the best yarns I've ever read by Miss Brackett, and I've read plenty of swell stories from her talented typewriter. Perhaps it seems rather pale when compared with some of the great novels from STARTLING's past—"Five Steps to Tomorrow," "The Fortress of Utopia," "Twice in Time," etc.—but this Brackett tale captured some of the spirit and fire of those early novels; something that has been notable through its absence of late. "Shadow Over Mars" was definitely good stuff, and it even had its moments of greatness.

I liked especially the little injections of fantasy found throughout the story—they were a definite asset. More from Miss Brackett if on a par with this story, would be most welcome.

The proverbial Bergey blotch on the cover has its redeeming features this trip; an unusual number of them, in fact. For one thing, it depicts a scene from the story, and is accurate in same. (Horrible thought of the month—has Bergey learned how to *read?*) Another redeeming quality is the fact that both humans are unusually well-drawn—long, low whistle at this point—and their faces, especially are excellent.

Lastly, the light blue background is a pleasant thing indeed after the lurid reds and yellows all too

common in magazine covers. However, there are also two items wrong about the painting. For one thing, the BTMs (a new twist by Boogyman Bergey; Big Toothed Monsters) are amusingly unconvincing. Also, there's too much action in the picture. Oh, for a nice, sedate spaceship cruising among the stars. . . . More shattered dreams of youth, I suppose.

That about takes care of the cover. For further information, I suggest that you contact some nationally known artist like Raphael or Finlay.

Sharp's "The Day of the Beast" was a good tale, but hardly a Hall of Fame story of stfantasy or anything else. It has its moments, however, and the Morey pic is really horrific.

Of the shorts, "The Cosmic Doodler" by Jacobi is about the best, which is saying absolutely nothing. "The Mad Domneys" by Verne Chute wasn't too awful, and places next. "The Invisible Vandals" by Charles Stoddard was very, very sad.

Of the interior pix, the Morey for the Stoddard story struck me as the best, with the vague but interesting full-pager on Page 13 tied with the Morey reprint for second place.

The departments were, as usual, both good and bad. "The Ether Vibrates" is the best of the good, and "This Startling War" is the worst of the bad.

And now, if I may, I'd like to make a few requests. I'll try not to ask for authors not at the present time writing; the same goes for artists. How about novels by Manly Wade Wellman, Jack Williamson, Henry Kuttner, and Neil R. Jones? Especially the latter, whom I haven't seen in some time but who can really write. Of the authors about whom I'm not sure as to whether or not they're still available, how about Eando Binder, Ray Cummings, and Edmond Hamilton? Among the artists, let's see a novel illustrated by Bok or J. Allen St. John. Who laughed?—*3956 Ledgewood, Cincinnati, Ohio.*

**That, fen firneds, was a real dissection. Oliver and his serene spaceships! But at least poor Bergy came off better here than in other fen screams. Not much has come in from Jones, Binder or Williamson of late, but spacebrothers Wellman, Cummings and Hamilton are still on top, and Henry Kuttner just got out of the Army and is hard at work on a longie for one of the mags. So you'll be seeing them, and soon, Kiwi Oliver.**

## BRACKETT AND BERGEY GO BRAGH!

### By George M. Frank

Dear Sarge Saturn: Come on, all you stf fans, let's raise the roof into the spaceways, shouting in one vast harmonious chorus: "Three cheers to Miss Leigh Brackett!" Let the news reverberate throughout the universe: "Leigh is crowned queen of science fiction!"

Yessir! "Shadow Over Mars" is one jim-dandy adventure of the future, jammed and crammed with thrills and chills. It elevates her among the top-notchers of stf novels. Long may she wave. She's captured me for a Brackett fan till my black hair turns white. Nor is that all. She should pose for Bergey for an SS cover and prove that beauty and brains go hand-in-glove.

Not that Bergey isn't doing a swell job as is. He now shines out as the brightest star of stf cover artists. His characters here are so life-like they all but walk off the paper. The grim tenseness of the situation whips through the mind—a Hercules of the future fighting for his beloved Hebe. And those monsters are enough to send shivers down Frankenstein's spine. In fact, I'm betting Leigh was startled to see her "Martian bleedhounds" looking so horrible, and it wouldn't surprise me if she didn't do any nocturnal beachcombing for many moons. Let's award Bergey a silver cup full of orchids.

"Shadow Over Mars" completely dominates this issue—and yet "The Cosmic Doodler" and "The Day of the Beast" deserve the rank of Lieutenant Swell Shorts. "The Invisible Vandals" trails close behind. But what haggard old, three-legged, one-eyed feline drug "The Mad Domneys" in by the whiskers! It belongs in some kids' book of fairy tales—but definitely. "Thrills in Science" are always good—and the letters, too. Particularly those by Mickey, Hamel, Gray, Krueger.

Oh Evans, heavens! Who tossed you over the high tension wires and stepped up the current?

[Turn page]


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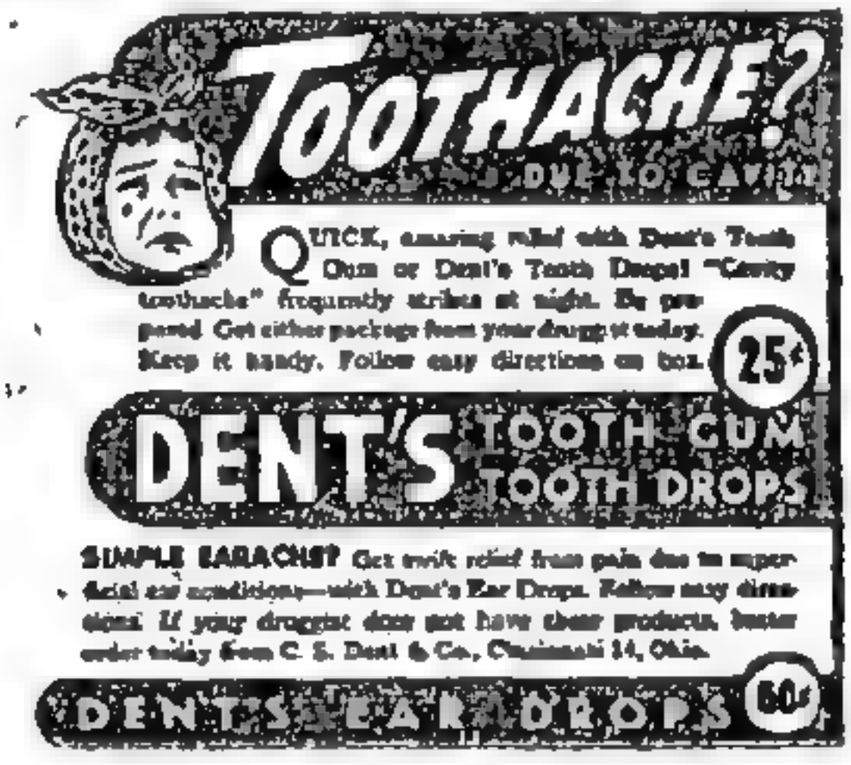
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Only terrific voltage could make the termites dance in your attic to enable you to imagine our dear ole sarge looked like the Frankensteinish monstrosity from the phosphorescent catacombs of Ganymede. No one imbiding the elixir of xeno could possibly grow so hideous. Rather, picture a snowy-haired old owl—pardon, gentleman—seven feet tall, handsome as Hector in happy humor.

Ah yes, Mart Mickey, supernationality could create an Earthian Eden when this holocaust of war dies out, what with all the modern scientific discoveries to make life more secure, if Homo Sapiens would but swallow his confounded greedy ego. Consider the new life-lengtheners: Sulfa drugs, penicillin, ACS, radioactive zirconium, polligen, nerve and vein grafts, cartilage banks, food yeast, anaesthetic gas machine, magic surgical crystals, infra-red cooking, autojector, DDT, electric shock grief-allayer, "smogless" cities, etc.

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Now, before I slip into the ether-waves, I would like to locate a copy of "Science of Life" by H. G. Wells, reported out of print. Would anyone sell me a late copy, in good condition, and how much?—*R. F. D. 2, Butler, Ohio.*

Such a rave with but one small request—and perhaps some of you other pee-lots could guide Kiwi Frank to a copy of H. G.'s "Science of Life." But mayhap, the lad's sincere, and our interspatial ego can sprout luxuriously under the blazing sun of his comments. Hope the brave new postwar world shapes up as amiably as it looks to you, *frere* Frank. But you should get a load of the grief they still have on some of our more advanced planets. There has even been a threat of a Xeno shortage on Uranus, due to a strike on the part of the treader birds. We're off as soon as our current chores are finished to settle it before the ultimate horror occurs—Xenobition!

Well, this brings us down to the close of another saturnine session with Saturn. So get back to your posts, you wall-eyed astrogoons—yes, that means you, Wartears, *and* Snaggletooth and Frogeyes! Stop kicking those galloping astro- dominoes around and put the old space lizzie into super-high gear.

We've got to crack this Xeno strike on Uranus before the superheater dries up the entire crop of Xeno weed. Your Sarge is already regarding the near future as desperate, and Neptunian Xeno is only fit for the denizens of that miserable planet.

Ahoy and farewell, fantods. The astrogation chamber is yours until the big next issue of SS rolls around. You won't be wanting to miss Captain Future now that he's sharing the same interspatial clubhouse. Till then, may you land on the planets you aim for, Kiwis! —SERGEANT SATURN.

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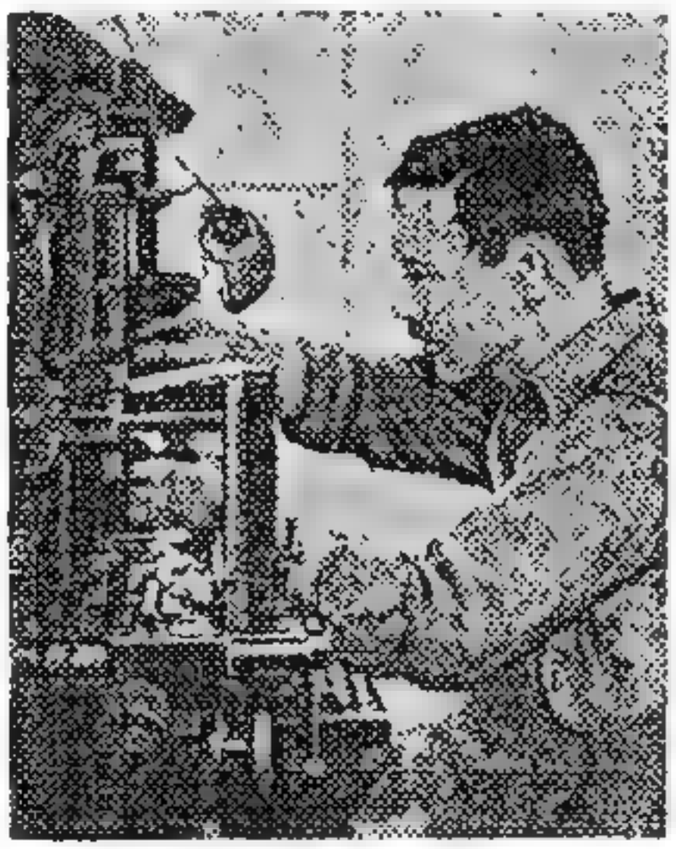
## Noel Loomis Gives Us the Low-Down on Noel Loomis

READERS of the featured novel in this issue will want to know a little about its author, Noel Loomis, who found time, despite his war job as a linecasting mechanic in Minneapolis, to write this splendid sequel to "City of Glass."

And those of you who read Mr. Loomis' account of himself in this column will realize how much being a writer is like learning to play golf—most of the time you're either missing easy putts or digging divots in rough or trap. But every so often you hit one nice and long and straight, and it's the memory of and hope for these hard high ones that keep you going. But Mr. Loomis gives you the gory details in person.



Noel Loomis

So let's take a look at his record.

I sold my first story in 1935. It was a short short that brought $25, and that blue check was the most thrilling piece of paper I've ever seen before or since. I assumed at once that my career as a writer was made, and I sat down and batted out short shorts by the hundreds (well, dozens, anyway) and bought $10 worth of postage and waited for the blue checks to start smothering me.

But it wasn't long before I was buried under returned MSS.

I sold my second piece of fiction in 1937—a mystery novel that got by because it had a more potent conglomeration of mechanically grewsome murders that anybody had at that time thought up.

I tried to be pessimistic about this sale, remem-

bering the two lean years. But a month later another short short won a contest and brought me $50. They couldn't hold me then. That fall another novel hit pay-dirt, and I was positively unbearable.

About that time, too, I sold an article to OUR ARMY proving that cities and civilians would never be bombed. The only satisfaction I have is that gas hasn't been dropped on cities—yet.

I was going strong in 1939, and by a little hasty multiplication I could see myself retiring in 1940 to write, but just then the old Minneapolis Journal, for which I worked, folded up, and my little routine was blasted. In another year I was beginning to go again. I sent another novel to the Toronto Star, and the editor wired for a synopsis, which usually was the prelude to a sale. Next day Canada declared war, and soon my story came back.

About this time I had two novels in to a big book publisher, and presently my agent sent on a letter from the president, saying that he was leaving Saturday for Europe, and noting that he hadn't decided on these two books, and so he was returning them.

A few months later another novel came back from a Canadian book publisher. He said he had expected to use it, but the government had just restricted the use of paper, and so—

Well, it just goes to show you.

I think I got more all-around kick out of "City of Glass" than from anything I ever wrote. This business of reading the readers' letters intrigues me. One's name gets in print so much, sometimes good, sometimes bad, but it's there. And it's the only field I know where the writer can find out what the readers really think about him.

"Iron Men" evolved more or less naturally. There were the City of Glass and a set of characters to start with; then there was a little sentence in a book somewhere about a dense star that, if it were big enough, would have so much mass and such a high critical velocity that light could not escape it. And then was when I was entering the machinist business, what with the war and all, and gee, there you have men of iron—all kinds of iron—and metals—and vanadium fingernails. Just mix and stir.

And just to show you how honest people can be, even in war-time, I sent the final draft of "Iron Men" by air express, trying to get it to New York so Sgt. Saturn could peruse it over the week-end. And here the other day I get a check for 84 cents from Railway Express as a refund. By which I deduce that the plane to New York was full up with priorities. Anyway, I got my 84 cents, and I'd never even have known the difference. They say there's nobody funnier than people.

A young fan of mine nailed me the other day and asked, "What is it in City of Glass you were scared somebody would pick a flaw in?"

And I, thankful that somebody cared enough to ask, answered with a very superior smile, "The theory of infinitely accelerating velocity. You know, the farther you get from earth the more your power accelerates your speed and the farther you get from earth and the more—etc."

I was so glad that at last I was to have a chance to argue with somebody about that. I fondly imagined it was my own idea, and I wanted to see if it would hold up. And so in about five minutes I was right in the big middle of a hot argument.

No, I wasn't trying to prove my theory was right. My young fan was proving that, I was trying to prove that it could be wrong! If there's anybody funnier than people, it must be writers.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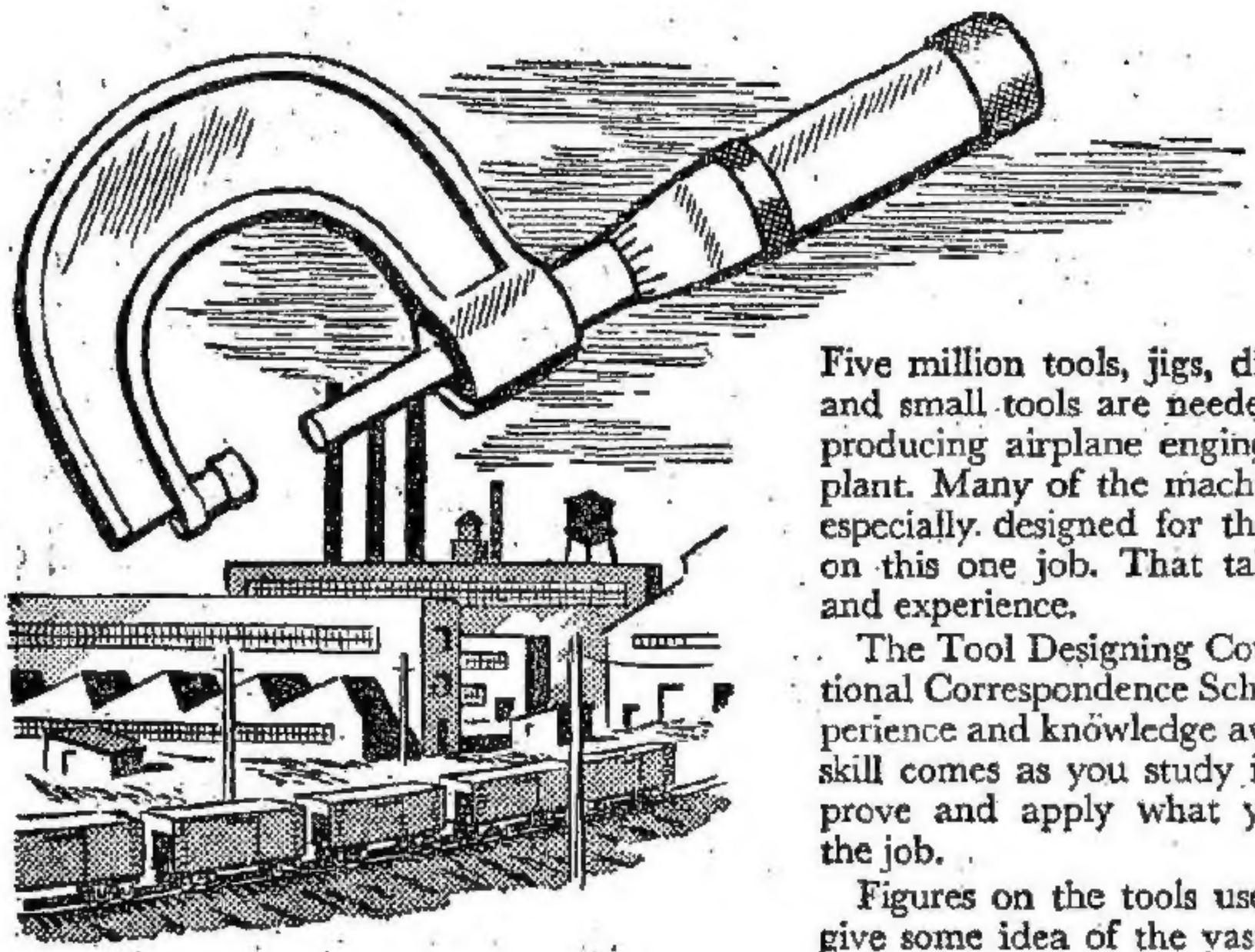

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